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[OFFICIAL NOTICE.]

## Thirty-ninth Annual Meeting, New England Association of Gas Engineers.

NEW ENGLAND ASSOCIATION OF GAS ENGINEERS,
OFFICE OF THE SECRETARY,
EAST BOSTON, MASS., Jan. 21, 1909.

To the Members, New England Association of Gas Engineers: The Thirty-ninth Annual Meeting of the New England Association of Gas Engineers will be held at Young's Hotel, Boston, February 17th and 18th, 1909. The annual dinner will be on Wednesday evening, Feb. 17th. A programme full of promise is being arranged, details of which will be announced shortly. N. W. GIFFORD, Secretary.

[OFFICIAL NOTICE.]

## Announcement of Meeting, Southern Gas Association.

SOUTHERN GAS ASSOCIATION,
OFFICE OF THE SECRETARY,
ROME, GA., Jan. 15, 1909.

To the Members of the Southern Gas Association: The Southern Gas Association will hold its next meeting in New Orleans, La., the 18th, 19th and 20th days of February. The date has been fixed by the Executive Committee so that all desiring to attend may have the benefit of the Mardi Gras railroad rates, which will go into effect Feb. 17.

I forward application blanks and copy of the Constitution and By-laws, which will inform you (Sections 6 and 6a) as to the requirements for active and associate membership.

If you are already enrolled as a member of the Association, kindly place the blanks in the hands of your associates and friends, who may be desirous of joining. If you are not already one of us, I will be pleased to receive and file your application. Yours truly,

JAMES FERRIER, Secretary.

## BRIEFLY TOLD.

FIRST ANNUAL MEETING, INDIANA GAS ASSOCIATION.—INDIANAPOLIS, IND., Jan. 21, 1909.—Dear JOURNAL: The Indiana Gas Association met as per announcement, at Indianapolis, in the Claypool Hotel, on the appointed days. The only drawback was bad weather, but the discomforts thereof were nil; headquarters and enthusiasm set them at naught. The paper list contained 8 numbers, not to say anything about President Dunbar's thought provoking address. Truly, the Supreme Court and its views on sufficient returns from money invested in gas undertakings both stirred things up mightily. Our own Dunbar looks all to the good after his sojourn abroad, and well satisfied he was (as we all were) over the Indiana Association's first annual. The membership was increased to 86, the only change in the list of officers was the naming of Mr. J. A. Mulholland on the Board of Directors, replacing Mr. C. H. Geist, who declined re-election. Of course, Mr. Carl H. Graf, and the Indianapolis Gas Company, did everything in their power to make our stay in their rapidly-growing city pleasant. President Dunbar was ably aided in his effort—and he is somewhat of a veteran, when it comes to managing the sessions of a gas association—by Secretary Eves. Incidentally, let me here say that the paper by the latter, on "Commercialism in the Gas Business," was at once thorough and practical. The paper by Mr. A. B. Davis, on "Gas Chemistry," is also a notable one. Our member-host (Mr. Carl H. Graf) may no longer doubt that he is a full-fledged hoosier, and that he is a worthy successor to that well-loved Indianian, the late James Somerville. The next meeting will be held in Indianapolis.—J. M. C."

STREET LIGHTING. IS GAS A BACK NUMBER?—"The gas lamp is in all certainty the best street lighting unit which has been tried out on a large scale in this country for the past decade, offering to the public, as it does, freedom from glare, suitable appearance and efficient results. Notwithstanding all this, however, its friends were apparently few at the January meeting of the New York Section of the Illuminating Engineering Society. At the session two electrical engineers had papers, the evident intention of which was to slur, rather than disprove, the claims made for street lighting by gas. As an instance, let me quote this from the paper entitled "Street Lighting:" 'While the average illumination on Massachusetts avenue, as shown by the curves, is somewhat higher than on Wisconsin avenue, it is not so uniform, nor does the roadway appear so well lighted, and it costs 20 per cent. more.' As Wisconsin avenue is lighted by the well advertised tungsten lamps, it may be interesting to note what the conditions are on these two avenues, as given in the report showing results of tests as given in paper—on Massachusetts avenue the lamps in use were tested; the number on Wisconsin avenue was 16:


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JAN 25 1909
SMITHSONIAN DEPOSIT

| Massachusetts Avenue. Type of Lamp, Mantle Gas. | | Wisconsin Avenue. Tungsten, 60-Watt. |
|---|---|---|
| Width of street | 160 feet. | 100 feet. |
| Height of lamp | 8.75 feet. | 16 " |
| Location of lamp | at curb, staggered. | Center at curb, on sidewalk. |
| Distance between lamps | 68 feet. | 96 feet. |
| Illumination, maximum | .044 | .021 |
| " minimum | .016 | .007 |
| Average | .028 | .013 |
| Average variation from main | 24.8 pr. ct. | 33 per cent. |
| Weather, Slightly Hazy. | | Clear. |
| Cost, per foot | $0.321 | $0.252 |

TABBE II.

Table II. is here given which is intended to show some facts *not* set out in the paper.

| Massachusetts Avenue. | | Wisconsin Avenue. |
|---|---|---|
| Cost per lamp per year | $20.85 | $24.00 |
| " " foot, lineal | .311 | .250 |
| " " " square | .002 | .0025 |

In comparing the cost of lighting streets of such varied character as those having 100 and 160-foot widths, the cost per square foot is a factor of more importance than the cost per lineal foot. Using this as a basis one finds that the gas installation produces an average illumination rather more than double that furnished by means of electricity; further, that electricity costs 25 per cent. more. According to the figures given, these lamps work at an efficiency of 1¼ watts per candle. instead of 1¼ watts as usually claimed. In the paper on 'Street Lighting by Tungsten Lamps,' the author stated that, 'The tungsten lamp maintains its candle power, in direct contrast to the rapid falling in efficiency of the mantle lamp, after a short period of use.' The listeners who knew smiled, but not one of the gas fraternity present, and there was at least one amongst them who had been prominent in the discussion of less important subjects, that raised his voice in protest. If such statements pass unchallenged in engineering societies, it can be readily seen that a Common Council or a Board of Aldermen will be in line towards easy convincing in a way very detrimental to the gas industry.—SPECTATOR."

NOMINAL REARRANGEMENT OF THE HUMPHREYS & GLASGCW PARTNERSHIP.—An official notification, to hand some days ago, but bearing date of the 31st prox., is to the effect that, as it had been decided to incorporate the firm of Humphreys & Glasgow, of New York, the hitherto partnerships of A. C. Humphreys and Arthur G. Glasgow, known as Humphreys & Glasgow, have been dissolved. Hereafter the name of the corporation in New York will be that of Humphreys & Glasgow, Incorporated. The business formerly done in London, England, under the firm name of Humphreys & Glasgow, will be transacted by Mr. Arthur G. Glasgow, trading under the name and style of Humphreys & Glasgow. Humphreys & Glasgow, of London, England, and Humphreys & Glasgow, Incorporated, of New York, U. S. A., will continue to co-operate in business as formerly, "although having no organic connection, the one with the other." The notice of dissolution is accompanied by another to the effect that the "business heretofore carried on by Humphreys & Glasgow, of New York, will be continued and conducted by Humphreys & Glasgow, Incorporated, with the following enlarged organization:"

*President.*—Alexander C. Humphreys.
*Vice-President.*—Wm. W. Randolph.
*Treasurer.*—Emile Gillaudeu.
*Secretary.*—Robert O. Luqueer.
*General Counsel.*—Howard E. White.

It will be noticed that the changes in the legal formation of the respective Companies are mainly technical in nature, save that that which were partnerships are now chartered companies. This in turn, though, brings about a decided change in the nomenclature of the personnel in charge of all the divisions, and we submit that everyone will agree with us in the statement that the named executive staff is certainly in every sense qualified to successfully dispose of business of any magnitude that may be the Company's portion.

CURRENT MENTION.—

JUST prior to going to press we received a copy of House bill "H. L. 26,393," introduced in the House of Representatives (60th Congress) by Mr. Smith, of Michigan, which provides that no gas company doing business in the District of Columbia shall "manufacture, make, sell or supply any gas for heating or illuminating purposes * * * which shall contain an excess of 10 per centum of carbon monoxide." The bill further provides and charges that the inspector for the District shall make frequent inspections of the gas to determine whether such per centum is contained, in which event the company or companies may be haled to a police court, and therein on "conviction be fined in the sum of $100 to $500, and be sentenced to prison at the discretion of the court to a term of imprisonment not exceeding 6 months." Next in order we imagine the Commissioners will be instructed to behead any baker who uses yeast as a preliminary in setting his dough batch.

THE Light Committee of the Richmond (Va.) Common Council has authorized Superintendent Knowles to "conduct a campaign for advertising the product of the city gas works." The 90-cent rate becomes effective in Richmond the 1st prox.

## Lighting and Heating the Buildings in which was Held the Last National Apple Show.

By MR. E. H. GIMPER, Spokane, Wash.

The illustrations here forwarded will likely be of interest to your readers, in that the photographs were taken at different points in different parts of the buildings that served to house the National Apple Show, which was held in this city last month from the 7th to the 12th, inclusive. My belief in connection with this article is that the total floor space of the buildings occupied constituted the largest single area ever lighted and heated by gas exclusively.

Fig. 1 is a picture reproduction of an aisle in the apple show building.

Fig. 1.

Fig. 2 affords an excellent reproduction of the "Billy" Sunday

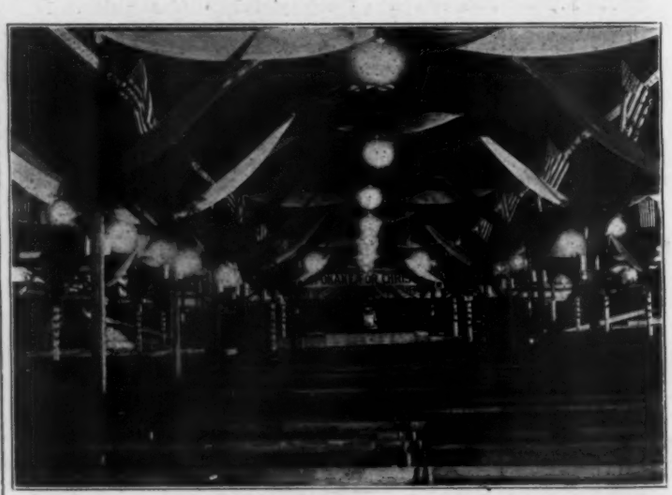


Fig. 2.

Tabernacle—no doubt many of your readers saw the redoubtable "Billy" himself years ago when he was one of the star players of the Chicago team. Fig. 3 shows one of the 200-light meters, the gas being supplied through a battery of house governors, that acted to reduce the pressure from the initial one of 16 pounds to the service one of 3 inches. The last (fourth) illustration is from a photograph of our (the Spokane Falls Gas Light Company) coke booth, which was not the least attracting feature of the Apple Show, proper.

The "Billy" Sunday Tabernacle, as shown in Fig. 2, contains 35,000 cubic feet of floor space, and was lighted by the agency of 77 Humphrey gas arcs, and heated by means of 25 Vulcan gas heaters. The Tabernacle, together with two others, holding a total floor space of 82,000 cubic feet, was also used for the purposes of the Apple Show. Even at that the space was really insufficient, in fact, the structures were overcrowded.

For lighting this 82,000 square feet of space we set 166 gas arcs, and

Fig. 3.

Fig. 4.

for the heating 50 Vulcans were hooked up. There were exhibited 20 carloads of prize apples, each car averaging 640 boxes, with 112 apples to each box. Wherefore one can readily figure out the number of apples on hand, and have some faint idea of the jollification that might have been had, had they all been converted into hard cider. Our average daily consumption during the length of the exhibit (6 days) was 50,000 per 24 hours. The lighting of the building, too, was as near to the ideal as could be imagined; the arcs having been placed 16 feet apart, there were consequently no shadows.

## Vertical Retorts for Burnley, England.

According to the *Journal of Gas Lighting*, the appended statement constitutes the text of "The Further Report on Vertical Retorts," submitted by Mr. J. P. Leather, Engineer to the Burnley Corporation on Municipal Gas Works. The Works' Committee, and later on the Town Council, sanctioned the report, which is decidedly favorable to the Woodall-Duckham system.

Gentlemen—In accordance with your request, I have pleasure in presenting a further report on the proposed adoption of vertical retorts, and on my recent visit to Berlin. The importance of this question lies in the fact that there is a general consensus of opinion that some of the ideas with reference to carbonization hitherto prevailing must be entirely changed if progress is to be made. A well-known American Gas Engineer—Mr. Frederic Egner—recently stated that, in view of the results obtained in vertical retorts, he thought it "a waste of time to discuss the horizontal retorts in any shape, with or without machinery, for large, medium, or small works; and the sooner all concerned wake up to these facts, the better for gas companies and their stockholders." It is not everyone who would commit himself to so strongly worded an utterance; but this expression of opinion is interesting.

In my journey and visit to Berlin that which impressed me most strongly was the large number of new works being erected in Germany, and the thorough way in which they are adopting the most up-to-date appliances in everything. If England is to maintain her position, it is evident that we must not cling too conservatively to old methods. Vertical retorts have passed the experimental stage and are being adopted in nearly 30 gas works on the Continent. The English systems of vertical retorts differ in some important respects from those in use in Germany. Before, however, considering these differences, it is well to understand why the putting of the retort in the vertical position is of importance.

Almost from the inception of coal gas manufacture it has been considered essential for good working that the coal in the retorts should be arranged in a thin layer, with a space above the layer for the passage of the gas, as it was evolved from the coal. The whole claim of the Coze patent for inclined retorts rested on the practicability of obtaining this result in a retort set at an angle of about 30° with the horizontal. This idea is now being given up, and inventors are turning their attention to various ways of working with the retort completely filled. The horizontal retort does not lend itself readily to full retort, on account of the difficulty of removing the coke. The retort must, therefore, be either set upright or erected at a steep angle, as is now being done in several works in England, under the patents of Mr. Love, of Guildford. I visited the installation of these retorts at Guildford in May last. They are set at an angle of 45° and work very smoothly, the arrangements being simpler than those in the German system of verticals. The carbonizing conditions being the same, the results are, of course, similar.

The German vertical retorts which we saw at Berlin are 16 feet 5 inches long. The settings are supported on steel stanchions at such a height that a man can walk underneath them. The top and bottom of the retorts are closed by hinged lids; but the arrangements for opening and closing the bottom lids are of a special character. When the retort is filled with coal it will be seen that the weight of the coal rests on the lid. When the lid is opened, the whole charge of hot coke at once falls out. An arrangement of shafts and gear is provided, so that the operator can open and close the lids by turning a wheel at the front of the setting. Any one of the 10 retorts in one setting can be operated by oue wheel; the particular retort lid to be opened being determined by the position of certain levers which give longitudinal motion to the shafts, on which are projecting feathers. The gear is somewhat complicated to describe without a diagram, but is simple and smooth in its working.

The coke falling from the retort is directed by a movable shoot on to a conveyor, which removes the coke from the retort house. The bottom lid being replaced, the operator working on the top puts a small quantity of coke breeze into the retort, to fill up the bottom mouthpiece, where the temperature is not hot enough to carbonize the coal. The retort is then filled up with coal. The charge remains in the retort 12 hours, instead of the 4 to 6 hours usual with horizontal or inclined retorts. As the retort is full of coal, the gas of necessity leaves the retort as soon as formed, there being no space in the retort in which its passage can be delayed. The heavy hydrocarbons in the gas are not, therefore, acted upon by heat to the same extent as

in the ordinary horizontal or inclined retort, in which there is a space over the coal. This absence of overheating has, as compared with horizontal and inclined retorts, a threefold effect: (1) It conserves in the gas hydrocarbons which in the older system are destroyed, and thus greater heating power is obtained in gaseous form. (2) The tar is thinner, containing very little naphthaline and very little "free carbon." It fetches in Germany 25 per cent. higher price. (3) The ammonia from the coal is not decomposed to the same extent, and the quantity is, therefore, increased 25 to 30 per cent.

The German engineers are apparently not satisfied with these results, but have been experimenting with chambers much larger than the usual retorts. One of these experimental settings we saw at Berlin; but there did not appear to be any advantage over the ordinary vertical retorts. At some other works in Germany large inclined chambers are being tried, approaching by-product coke oven practice. From a careful consideration of what has been accomplished in this direction in America and in other countries, I have formed the opinion that no substantial advantage is likely to be gained thereby.

To return to the vertical retort, there does not seem to me any advantage in the German style over the inclined retorts set at 45°, as at Guildford. In both cases the retort is filled full of coal and can be readily charged and discharged. If no further advantage could be obtained, I should be inclined to recommend the erection of retorts on Mr. Love's (Guildford) system.

The system of vertical retorts which I have recommended to the Committee is that known as the Woodall-Duckham and differs from the German system in that it realizes what has for a long time been felt by many English engineers to be the *desideratum*—continuous carbonization. On our present system coal is received into the works and handled in large quantities. It is then divided up into small charges of a few cwts., each of which is put into hot retorts to the accompaniment of much dust and smoke and loss of gas. Again, the hot coke has to be handled in such a way as to subject the men employed to heat and steam. In the Woodall-Duckham plant the coal passes through feed rolls into the retort, without any smoke or flame or loss of gas. The coke is taken out after being allowed to lose the greater part of its heat, so that no inconvenience or nuisance arises. This absence of smoke and steam is of especial importance for a works like ours, which is situated in the heart of the town.

The arrangement of the retort is similar to that of the German plant, but the retorts are larger. Instead of being 16 feet 5 inches, the length of the retorts is about 25 feet, and they are arranged in settings of 4 instead of 10, as in Germany. The cross section of the retort is 24 inches by 10 inches at the top, and 30 inches by 22 inches at the bottom. The Germans heat their retorts hottest at the bottom. The Bournemouth retorts are hottest at the top. The German retorts produce about 15,000 cubic feet of gas per day, the Bournemouth retorts 30,000 to 40,000 cubic feet per day.

The coal, as in the German system and our own existing inclined retorts, is elevated into overhead hoppers. From these it passes in a slow stream into the feed rolls, one of which is attached to the top of each retort. The feed rolls are 12 inches in diameter and revolve 3 times per minute, keeping the retort full of coal without allowing the gas to escape. At the bottom of the retort, instead of the usual mouthpiece and lid, is a large cast iron extension of the retort, containing a small shaft revolving very slowly—say, about twice an hour. This shaft has on it projections which cause the coke to move horizontally and fall into a discharging roll below. The speed of rotation of this shaft can be very exactly controlled, and by this means the quantity of coal being carbonized in the retort is regulated. A small quantity of water is allowed to trickle into the chamber just above the shaft, thus preventing the ironwork being unduly heated, and to some extent cooling the coke, which is no longer red hot when it emerges from the discharging roll. This roll is a cylinder 2 feet in diameter and 2 feet 6 inches long. Normally its open side is upwards to receive the coke falling from the retort. At intervals, when about half full of coke, the drum is rotated to allow of the coke falling into a wagon or on to a conveyor for removal from the retort house. The arrangement is such that the retort is not open during the act of rotation, so that there is no escape of gas from, or admission of air to, the retort.

The advantages to be obtained by the adoption of this system are as follows:

(1) Increased make of gas per ton. At the Nine Elms works of the London Gas Light and Coke Company, 12,423 cubic feet of 15.82-candle gas were obtained from a coal no better than, if as good as Burnley coal. At Poole, with coal somewhat inferior, 14,165 cubic feet of 14.16-candle gas were obtained. The illuminating powers required in the South of England are less than we are accustomed to work to; but allowing for this, we may expect to obtain the equivalent of an increase of 10 per cent. on our present make.

(2) Improved quality of tar, due to the smaller quantity of naphthaline and "free carbon;" while the quantity of tar appears to be about 5 per cent. greater.

(3) Increased yield of ammonia of about 25 per cent.

(4) Improved quality of coke.

(5) Absence of trouble from "stopped pipes" and pitched up hydraulics. This advantage, which has a direct pecuniary value, is common to all systems where the retort is charged full of coal. Under our present system men have to be constantly employed on the unpleasant work of clearing stoppages, etc.; and stoppages often entail loss of gas and deterioration of retorts. In the Woodall-Duckham system the hydraulic main and ascension pipe are entirely done away with.

(6) Increased make of gas per retort, and in proportion to ground space occupied. The new retort house now being erected, with inclined retorts arranged in 4 tiers, would only produce about 2,160,000 cubic feet per day, while fitted with verticals, we may expect to make 2,700,000 cubic feet per day. This means an important saving in capital cost.

(7) Absence of dust and smoke and, therefore, better conditions for workmen, and reduced nuisance to neighborhood. This important advantage I have already dwelt upon.

(8) Reduction in heavy labor. The work of drawing and charging the retorts is practically done away with. The chief labor being the removal of the coke and the charging and clinkering of the furnaces.

(9) Reduced cost of maintenance. The increased life of retorts set vertically, and the reduced wear and tear on tools, will much more than compensate for any slight increase due to the small amount of extra machinery.

The price quoted by the patentees is $54,000 for 9 settings, which will occupy one-half of the new retort house. These 9 settings I estimate will produce 1,350,000 cubic feet of gas per day, which is at least 25 per cent. more than would be produced in the same space with inclines.

The estimated cost of the retort house and retorts complete, as originally designed to accommodate 144 inclined retorts, and produce 2,160,000 cubic feet of gas per day, was $105,000. If the retort house is fully equipped with the vertical retorts, the capacity will be about 2,700,000 cubic feet per day, and the cost about $150,500. If allowance is made for the increased capacity on the same ground space, the extra cost is only about $13,000 for the plant to make 2,160,000 cubic feet per day. The cost of producing gas by inclined and vertical retorts respectively is shown in the following statement:

*Cost of Producing* 1,350,000 *Cubic Feet per Day.*

| | | |
|---|---|---|
| With Inclines—108 Retorts— | | |
| 129 tons of coal | | $371.00 |
| Wages in retort house | | 45.00 |
| | | $415.00 |
| Less residuals— | | |
| 58 tons of coke | $130.00 | |
| 165 cwt. of tar at $8 per ton | 42.00 | |
| 30 cwt. sulphate of ammonia | 63.00 | |
| | | $235.00 |
| | | $180.00 |
| With Verticals—36 Retorts— | | |
| 113 tons of coal | | $348.00 |
| Wages in retort house | | 20.50 |
| | | $368.50 |
| Less residuals— | | |
| 50 tons of coke | $112.50 | |
| 150 cwt. of tar at $1.25 per ton | 47.00 | |
| 31 cwt. sulphate of ammonia | 66.00 | |
| | | $225.50 |
| | | $143.00 |

This shows a saving of more than $60 a day, or 4.2 cents per 1,000 cubic feet, when only one-half the retort house is working. This will much more than repay the extra cost of the settings in the first year of working.

In the above estimate of cost I have not taken the full claims of the patentees, but have formed my own judgment from seeing the working of the plant and the results obtained. There are also several savings which it is a little difficult to give monetary value to, which are not taken into account above. For example, the absence of naphthaline in the gas. This, which at present costs us from $250 to $500 per annum, will be entirely got rid of. Again, attendance on the hydraulic mains costs us about the same amount, and is not included in the cost of gas made by inclined retorts given above. I have not included the cost of maintenance, which would be less.

The above figures are so favorable to the new system that, after inspecting the latest installation at the Nine Elms works of the London Gas Light and Coke Company, I have no hesitation in recommending the Committee to enter into a contract for the erection of the 36 retorts tendered for.

## Safety Valves.

[Prepared for the JOURNAL, by "R."]

Fig. 1 illustrates a lever safety valve which I saw not long ago in use in a certain gas works. A miscalculation had been made by someone, for the reason that the piping was so arranged that the weight *A* of the lever was constantly contacting, as shown. The action of the pressure in the valve on the stem caused the lever with its weight to bob up-and-down. The weight made a rapping sound on the piping. An examination of the valve proper showed it to be in good order. The system as arranged was installed by a competent workmen, and the apparatus bore the trademark of a reputable manufacturing concern; but the whole thing was handicapped and placed in dangerous zone due to the carelessness of the person who installed the pipe. This illustration is given, together with others of a similar character, for the reason that the writer has noticed so many defectively placed and operated safety valves in different gas works. The valves refer not only to the boiler types for steam pressure regulation, but to gases, compressed air, and, as in one place visited, to vapors created under pressure for experimental purposes.

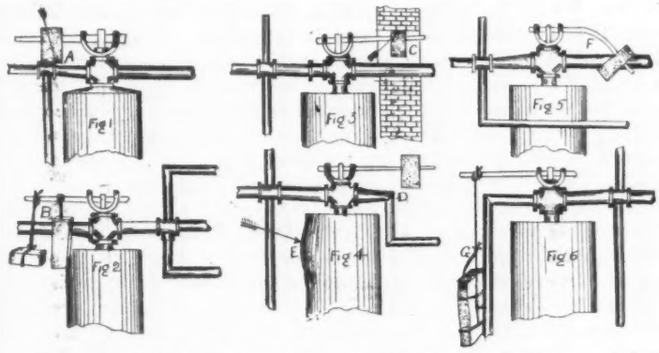
In a plant where they were making carbide gases another valve was discovered in bad order. In a calcium light works, where cylinder gases were being made from oxygen and hydrogen gas making materials, still another defective valve was seen. But, referring back to the valve in Fig. 1, this defect was readily corrected so that the weight and lever might work, by removing the pipe, using an elbow to drop the pipe down far enough to clear the action of the weight.

In Fig. 2 the trouble is readily detected. I saw a jumble of weights bobbing about the cylinder itself and tangled at the pipes, as at *B*. It is not right to expect effective results from such an important factor as the safety valve when it is abused in this way. Not only were the bobbing weights a hindrance, but unsightly to the eye of the mechanically inclined man. The weights were removed and a standard single weight was put on. Then the valve action was found defective in that it was clogged with gummed stuffs. The foreign matter was cleaned, then the rod stuck because it was sprung. The rod was straightened, a leak or two fixed in the pipe joints and all went well.

Quite an odd occurrence was observed in a gas works where a safety valve had been installed with two defective features, as in Fig. 3. The first defect is readily seen, in that the lever and weight were set so as to operate within the small cavity in the masonry wall, at *C*. Of course, there was not space ample for the correct operation of the weight and lever which were checked in action oftentimes, developing again a danger point in the system.

We simply removed several tiers of brick to give the lever more play room. The principal error was in making the escape pipe too small, so that, even with the valve throat open full, the steam could not exhaust as fast as ready to go out because of the smallness of the general outlet pipe. I would examine all valves with a view of determining the size or capacity of the outlet pipe in case of a rush of steam or gas, or compressed air, or other vapors generating out of the valve to full capacity of the valve passage.

I actually saw a safety valve cylinder bulged, as at *E*, due to the fact that one day the pressure exceeded the capacity of the outlet. The valve itself was open full size and let out the surplus gases freely enough; but the gases were checked at the small turn at *D* in the exhaust. There being no other way to relieve the pressure, the cylinder wall expanded, as at *E*. Then I saw a weight acting like a file on a pipe, as at *F*, Fig. 5, and no attention was paid to the matter. The lever was sprung till it looped down as shown, thus letting the weight bind on the pipe surface. The vibrating of the weight up and-down was sufficient to gouge into the pipe wall, which was at the time quite thin. The lever was taken out, straightened and replaced. If the proper weight gets lost, as sometimes happens, it is best to order another. Another weight trouble is shown in Fig. 6. The weight was missing and a slab of metal was tied on, as at *G*, with a rope. Once more the weight got in its frictional rubbing act on the pipe




surfacing, and at the time seen was about to break open the remaining thin wall of the pipe. Safety valves need attention. They should be tested oftener than they are. The locomotive engineer often tests and cleans his valves.

## Competition from High Efficiency Lamps.

[Paper prepared for the Third Annual Meeting, National Commercial Gas Association, December, 1908, by MR. T. J. LITLE, Philadelphia.]

In considering the modern gas light from an economical standpoint I will limit myself to the inverted type of gas light, not only because this type is most efficient for general illumination, but also because it is an outcome of accepted system.

There are a great many things to handicap the general introduction at the start. Many thought that the European burners and lamps could be simply and easily adapted to American conditions, but this was not the case. Consequently we hear from some parts of the country to the effect that the early inverted burners worked perfectly while others failed miserably. The gas companies themselves have readily realized the importance of uniform conditions, so that a great deal of this early trouble has been eliminated.

When the original Welsbach, upright mantle was first placed on the market in America, practically the same burners they were operating successfully in Europe were tried here. The burner was simply a plain Bunsen tube with a non-adjustable gas check. The practice at that time was to use different size gas checks in the different cities. These checks varied with the local pressure as well as the gravity, and, where instructions were rigidly carried out, this scheme seemed to work, and where a very competent fitter was found he could be instructed to ream the orifice, in cases where it was too small, so that he might get its right efficiency.

Now, off-hand, this might seem to be an ideal condition, but in America to day our gas conditions unfortunately are not uniform, and if a No. 56 drill is used for drilling the orifice of an inverted burner, and it works to perfection when the burner is installed, there is no guarantee that this same burner will work as well the next day or the next week. If the pressure in the building drops, either because of an overloaded service or meter or local low pressure in that part of the town, then the light given by the mantles is entirely unsatisfactory and it becomes necessary for the consumer himself to have some ready means at hand for increasing the orifice.

A change in gravity is usually worse, as far as the apparent efficiency of the burner is concerned, as a change in pressure. The burner may be operating most satisfactorily in the early part of the day, but later on it may be seen fluttering or popping violently. This is an indication that there has been a decided change in the gas, which may be caused by either a change in the candle power, due to a greater or less enrichment, or in cases where mixed gases are used, such as carburetted water gas and coke oven gas, varying in their proportionate mixtures from time to time during the day. I would strongly advise against any change in gravity. I consider it more important to have uniform gravity than uniform pressure, although, of course, a uniform pressure is extremely desirable.

With the improvement in gas conditions, which really have been very decided in the last few years, as well as the improvement in the construction of burners and the improved process for the manufacturing of mantles, we have to-day a highly satisfactory system of inverted gas lighting, and one which has readily adapted itself to the conditions in America. The old bugaboo of the objectionable heat of the burner is being removed step-by-step, with other increased means in efficiency, as well as the more complete ventilation of the glassware used on the

burner, for the hotter the glassware the greater the heat radiation. Thus it will be readily noted there is very little heat radiation from the inverted burner when equipped with a type of glassware having a cylinder inside and ventilated from the bottom. The early burner equipped with this type of glassware was not satisfactory on account of the close proximity of the heavy neck of the reflector to the heat source. This has largely been overcome by the substitution of the metallic, non-breakable neck for the thick glassware neck.

The convenience of lighting has been carefully worked out to place the inverted system of gas lighting on an equal plane with the electric system, and this feature is extremely important. The clusters of inverted burners equipped with the holophane glassware may be lighted and extinguished by simply pulling a chain. Furthermore, they are of the multi-unit type, separately controlled, so that the consumer may readily turn off from one to four of the burners to suit his requirements, which feature has been found by close observation a very important one.

In determining the true lighting efficiency of a device or lighting appliance, it is necessary, in order not to deceive ourselves, to do the most accurate photometric testing. In electric light testing this has been reduced to a science, but in testing a gas lamp this becomes an entirely different and extremely difficult matter, for not only do we have to assure ourselves that the standard source of light to which we compare our unknown source must not vary, but we must know exactly the nature of our gas conditions, and we should be in a position, in running one of these tests, to have on hand and under our own control a sufficient quantity of gas to run through the entire test.

In addition to this we must determine absolutely, not only the heating value, but we must record as well the nature of our gas, and if a mixed gas is being used we must duplicate with the utmost precision our gas conditions every time we compare one gas lighting appliance with another. A laboratory which is not equipped to do this class of work is not equipped to give accurate information.

Now, taking up my subject of "Meeting Competition from High Efficiency Lamps," I will proceed.

A great deal of discretion is required in the proper placing of high efficiency units, for if we are not careful it will be found that we are placing our lamps so low as to be throwing bright circles on the floor, with the counters and shelves improperly illuminated.

The inverted system is at its best when the lamps are placed high in the room, for in such position not only is the radiated heat less perceptible, but the light in this position is well above the range of normal vision. By this I mean that when a customer walks into a shop he will not be attracted by the powerful lights which are hung low, and so contract the pupils of the eyes; but he will rather walk into a well illuminated room and glance at the goods the merchant has on display. In the first place, after looking at a powerful, low-hanging lamp, it is quite impossible to distinguish clearly any details as to patterns and colors of the underlying merchandise, and the effect on the customer is not pleasant. There is a certain sense of satisfaction, which would probably be rather hard to explain by the customer, but which nevertheless exists, in a case like this. He does not seem to be exactly suited or pleased with the character of the store itself, and this can in a great many cases be directly traceable to poor lighting.

I do not believe that in this country the gas man is going to be compelled to greatly decrease his gas consumption by being compelled to place upon the market small lamps, but I do believe he is going to be compelled to give more useful light to the consumer than he is now giving. From 15 to 20 feet of gas, at the prevailing rates, is not at all out-of-the-way, if the lamp consuming that amount of gas is throwing all of the light produced in the useful direction; for, if this is so, the competition with the metallic filament electric lamps now on the market will be all the keener. Your consumer does not want something for nothing, yet he certainly wants the most for his money; and the only way to give him the most for his money, it seems to me, is to carefully study the question of useful illumination.

It takes a good deal of persuasion sometimes for a solicitor to convince a customer that it is not at all a good thing for him to hang an arc lamp on an outlet, simply because it happens to be sticking through the ceiling, regardless of its proper location; nor is it a good thing for the customer to simply use only two arc lamps in a space where three arcs are really required. Again, it is quite necessary for someone to see that the enterprising solicitor, working on a commission basis, does not load the consumer up with four arc lamps when he really needs only two. I would strongly advise each one here carefully brushing up on the subject of illumination, for the time is at hand when we must use data instead of mere talk to convince the consumer that you have the best proposition.

We now speak of the lighting value of any particular fixture in terms of its mean, lower, hemispherical candle power, and we take the average mean, lower, hemispherical candle power, which is computed by means of a Rousseau diagram and, knowing the consumption of gas required by the fixture, we can very readily compute the actual cost of useful light given by the device and express graphically, by the length of line, the amount of light given for 1 cent as compared with the amount of electric light produced for 1 cent, and these figures are extremely interesting. They show, moreover, on honest test, that the new electric lamps, if they are equipped with the most efficient type of reflector, are coming dangerously near, and in some cases excel, the older types of gas lighting appliances; and it really is essential that the attention of every man in your appliance department, and in fact the attention of every person connected with your company, should be drawn to these matters.

Do not deceive yourselves with the idea that the electric tungsten lamps are not going to be commercially successful. I have given this subject a great deal of careful attention, and while I know perfectly well that there are thousands of tungsten installations which are really not satisfactory, this is due to the fact that the American lamp has not been perfected. The one very weak feature seems that the lamps blacken very early in life and that quite a few lamps burn out. This was very marked recently by a test made in our laboratory, in which two 60-watt tungsten lamps out of six, burned out the first night of an endurance test and two others blackened inside of 10 days; but, at the same time, this condition will be overcome. I give you absolute assurance of this for the simple fact that our special investigation, which we have just finished, of several months in England and on the Continent, clearly demonstrates that the European lamps are being made very satisfactorily. In fact, there was so much at stake to the electrical people, that it is worth their while to spend almost an unlimited amount of money to gain this end, and when once they have put their shoulders to the wheel you will not find them very apt to stop pushing.

The high cost, also, of these lamps at the present time, is only a matter of very short duration, for they are cutting the price of the metallic filament lamps in Europe every few weeks, and it is possible to buy tungsten lamps over there of very superior quality to the American lamps for surprisingly less than they can be obtained in this country.

One of the leading chemical manufacturing concerns of Europe, in fact the concern that first succeeded in producing thorium nitrate, after the invention of Dr. Auer von Welsbach had been given to the world, is now producing successfully chemically pure tungsten for use in perfected lamps, and this same concern has expert chemists in this country instructing at least two of the leading electric lamp companies as to its proper use.

In comparing the cost of lighting by electricity with gas, I have purposely used the most highly developed form of electric lighting, namely the tungsten lamp, used on a fixture equipped with the holophane reflector, and practically the same equipment, namely the separate inverted burner equipped with similar glassware, and when we compare the two on this basis it will be found that the light distribution from one of these electric fixtures fitted with four, 60-watt tungsten lamps, is far below the light given by an equal number of inverted burners equipped with similar reflectors, and if the cost of electricity is figured at 10 cents per kw., and the cost of gas at $1 per 1,000 feet, it will be found that the inverted fixture is giving somewhere around three times as much illumination for the same money.

To gain a very high efficiency in the use of gas, it will probably be necessary, on the start, to use a little more supervision in the installation and to give a little more instruction to the consumer as to its proper use. For instance, these cluster fixtures are equipped with individual pilots, and it is not at all a good thing to turn these pilots so low that they will be affected by draughts in the room. Again the consumer should be carefully instructed as to the lighting of these burners, and should be told that they are similar to burners he is familiar with using in his private home, and even should the pilot fail on any burner, due to too small a flame or some deposition from the gas clogging the gas ways of the pilot, it is a very simple matter for him to light his burners with a taper or an electric torch. In fact, in a great many cases the electric and alcohol torches are in very successful use and a little instruction to the consumer would obviate an immense amount of dissatisfaction. For instance, I happen to know of one case in particular where the consumer had a large

number of these cluster gas fixtures in his place of business, on one fixture of which one burner failed to operate. He very promptly called up the gas company and told them his troubles. Instead of sending a man all the way down to the consumer, the man at the other end of the line told him to strike a match and light the burner (it was just the ordinary inverted burner) and he seemed to be very much surprised that he could do this.

I mention this to merely show you that the consumer needs a great deal of attention in the most trivial matters, and he is always eager to absorb any information which you may be pleased to pass out. In Europe this is especially true, and it is due entirely to the fact that the gas conditions are superior; for I believe that in a great many of our larger towns to-day the gas conditions could not be improved, and it is due to the fact that a good, lively interest is taken by the consumer in his appliances and to a certain pride in his lighting effects.

The newest phase of the inverted system of lighting, is the adaptation of the inverted mantle to the gas arc, and a great deal of thought has been given to this subject in the last couple of years; but in general appearance it has very unfortunately trailed after the now out-of-date electric arc lamp, and we have actually tried to imitate it in appearance. We have the spherical globe with the stack above. If there is any one thing in the electric lighting which has been criticized to the last degree, it is the form of the electric arc lamp. Architects to a man decry its use, and whenever they have been compelled to submit to it, they have tried to make it more or less ornamental, to cover up the homely superstructure. The time is ripe, therefore I say, for a radical departure from the very old types of lamps, for there has not been very much change in arc lamp designs since Brush introduced his first electric arcs. And so I think the present indications are that the inverted arc lamp has not at all settled down to a permanent design, for the possibilities are very great for some more convenient construction. The lamp, instead of containing a large number of separate parts and shells, should be brought to a very simple cluster basis. Furthermore, to be commercially successful, it should sell for about the same price that the upright arc is now bringing, otherwise it will be all the harder to convince the consumer that it will be a good thing for him to throw his old arc lamps in the cellar and buy another one for twice the price that he originally paid for the first lamp, and it will be also probably just as hard to convince the board of directors of your gas company of the same fact.

I am not a believer in giving something for nothing to the consumer, but I do believe that a very large volume of business can be done if a very highly efficient, inverted, self-contained cluster can be perfected which will meet these above-named conditions. Furthermore, I believe it is highly necessary that we should not very much decrease the total volume of light over that given by the present type of upright arc, nor do I think it necessary to very greatly decrease your consumption, for the simple reason that there is a very steadily increasing demand by the American people for more light, and, as I stated before in this paper, more light to them means more useful light.

If we look across the water, we find in Berlin, for instance, gas street lighting which is of a truly wonderful nature. Gas is placed under a high pressure and several large inverted mantles are used in a single lamp. The effect is most wonderful with this type of lamp properly placed; in fact, those who have recently returned from Europe thought it far excels even the flaming electric arcs which are in use over there in great numbers. I hardly think you will find the Americans to be much behind the Europeans in matters of this kind.

Returning to the construction of the inverted arc lamp, I would also say that the finally successful lamp must be one which will not require as much maintenance as even the present upright type of gas arc, and if the gauzes in the burner tubes can be eliminated, I know from actual experience that lamps can go for a period of several weeks without an inspection and maintain a high efficiency, and we all know that if we could place our arc lamps on a maintenance basis where they would require less frequent inspection, we would be able to decrease our maintenance charge and this would immediately tend to popularize the system.

*Discussion.*

Mr. Litle—Regarding the tungsten question, I would say reports we have this morning are that the leading chemical supply house in Europe is negotiating with two of the largest electric lamp manufacturers in this country for the sale of the tungsten as used abroad, and I think it will be a matter of only a few weeks or months before these lamps will be in very good shape; and, furthermore, these same people were the people who first in Europe developed the manufacture of pure thorium. In the first instance the Welsbach mantle was produced, and this chemical supply house produced a very good grade of thorium. They are now producing a very good grade of tungsten. The trouble with the manufacturer is not the high price of raw material, but the very expensive process of manufacturing. So I think we may expect a very great reduction in the cost of these lamps to come very soon.

Mr. Colgate—What is the difference in the cost of maintenance between the tungsten and the gas cluster?

Mr. Wrightington—I want to emphasize what Mr. Litle said about the tungsten lamp, especially regarding the price. I had the privilege of going through a tungsten factory in Germany this summer, and it was perfectly evident that the particular process which was used there was not an extremely intricate or expensive one, and, however the result may be with the present American lamp, it is probable that some system of making the tungsten lamp can be introduced into this country, which will make a low first cost for this lamp. There is no reason from the manufacturer's standpoint why it should cost much more than the carbon lamp of to-day. I think the price on the tungsten lamp is simply being held up, due to the question of adjusting the supply and demand, etc. The only criticism I have to make respecting Mr. Litle's paper, is that he makes no mention of the quality of the light of the inverted lamp. It seems that gas men made a serious blunder in the past in advertising gas lamps, because they are cheaper, and trying to sell them because they are cheaper. You will find most merchants operating a store and doing a high class of business would not mind paying 3 or 4 times as much for their light, if they get the better one. The question of even a thousand dollars is not what is going to make them change from electricity to gas, and the fact that we fall back on the quality of the light, and talk about its cheapness, has made the public feel that a merchant changing from electricity to gas was doing it because he wanted to save money and business was not good. It has been my experience lately that with the inverted lamp we can sell it on the basis of the quality of the light itself. It yields a splendid light. We have made demonstrations in stores, making a comparative demonstration of the Nernst, the tungsten, the electric arc and the inverted gas lamps, and the customer said, "That is the lamp on light alone—quality of light alone. Incidentally, if you can save us something, we are so much better off." But now that this tungsten lamp question has assumed such a serious aspect, it behooves us to bring every argument that we have to bear on the quality of the lamp, its economy and the like.

Mr. Blythe—The question of the maintenance of the reflectolier, which has been under discussion, is asked me 10 or 15 times a day by salesmen. They almost refuse to sell the fixture if it is not to be maintained by the gas company. We sell the fixtures in Minneapolis with the understanding that we will maintain them at the actual cost, until we find just what we can afford to maintain them for. I think it will be a period of 6 or 8 months before we know what the charge should be for maintenance.

Mr. Stannard—One of the most interesting features of the paper to me was where the illuminating engineer was in the question. I feel that, in order for us to successfully meet the competition mentioned, our representatives should be placed in a position where they have the very latest illuminating engineering statistics and information. At one time, we felt that the open flame burners gave a superior light. Later on, a single burner incandescent light was placed on the market. Such progress has of late been made in electric lighting that we find these two forms of gas lighting just mentioned insufficient, and also find we must now use incandescent gas arcs in either one of the two forms. So I feel that each representative of the department should be placed in touch with someone possessing the knowledge of illuminating engineering; and, better yet, if the company can afford it, that they maintain an illuminating engineering department, so that, whenever representatives run up against competition, they may take with them a man versed in illuminating engineering to the end that they can recommend to the prospective customer the very best system of lighting, and so that they can explain just exactly how the lamps should be arranged, the candle power to be installed, and any other information along these lines. So I feel that one of the best weapons that we have on hand to compete with this competition is to supply our representatives with this information, so that they can most intelligently recommend to the consumer the installation of gas lighting.

Mr. Litle—To the question asked about the cost of maintenance, the comparative cost of maintaining burners of these two varieties of lighting devices, the electric tungsten and the inverted fixture, as has just been stated here, is probably not known, at the present moment, as to just what it will cost to maintain such a fixture, but the present indications are it will not be higher. But even if the cost should run a bit over the older type of lamp, it would well warrant the additional cost if you could save the consumer and still sell him gas rather than give him up to the electric company. As to the cost of maintenance of the tungsten fixture, we do not honestly know. We have no absolute way of finding out how much it does cost. We know the life of these lamps is supposed to be about 800 hours. Usually it is below that. If we estimate the life of these lamps at 800 hours, and figure around 4 or 5 hours per night, it is but a matter of a very few months before you have to renew lamps at best. If you have to renew all the lamps every 4 months, and the 60-watt lamps cost at least $1.25 each, there is $5 for the renewal of the 4 lamps. If they really last 4 months in service, that would be $1.25 a month, for lamps alone, not to mention the cost of the current to supply the lamps. But I hardly think the electrical fellows are getting out well on maintenance cost. In larger cities the tungsten lamps have been hung in sockets where carbon lamps have been used. In Philadelphia, I have noticed where clusters have been in store windows, four tungstens will be in the cluster. A little later on, one tungsten was gone and the carbon was in his place. Shortly after, two tungstens were gone, and not very long after that they were all gone. Why didn't the customer buy another tungsten lamp and put in another cluster? I have an idea he thought it was rather an expensive proposition. The condition of the tungsten lamp in America is about the same as when the mantle was first introduced. When a man bought a mantle he paid 50 cents for it, took it home, and burned it off, and it broke right away, and you may be sure he didn't go down town and buy another mantle next day. This is about the condition of the tungsten lamp to-day, but it does not indicate that it will continue to be so. So we cannot get the absolute cost for installation at the present time for tungsten lamps. As to the quality of the light, I think it has been pretty well shown by Mr. Ives that the quality of light from a mantle burner is very good, particularly good for matching colors. In fact, he said, in a paper before the Illuminating Engineering Society recently, that the Welsbach mantle came as near sunlight as any lamp now in use; but that alone does not tell the whole story. Have you ever had occasion to buy an Oriental rug—if you ever had money enough—you will find they do not display them by daylight at all, but usually under the electric light. The electric light, particularly the carbon lamp, is very rich in red rays, and the rich colors of the Oriental rug show up better under this electric light than under daylight, so it is not always necessary to have the whitest possible light obtainable. In a good many cases, a mellow light is acceptable to the consumer. You will hear a great many people say they like a great big kerosene lamp because the light is so soft and mellow. So we must not run off at a tangent and say we want the whitest light obtainable, simply because Mr. Ives happened to say that the mantle light resembled daylight. We want to get people a satisfactory light. We do not necessarily want to put clear globes on lamps. It is far better to protect them with a soft diffusing globe.

## The H. Mueller Manufacturing Company's School of Instruction.

The annual school of instruction of the salesmen of the H. Mueller Mannfacturing Company has been brought to an adjournment, and the men are now on the road, beyond a doubt better equipped for their duties than heretofore, even though they all came to the meeting well-stocked with the knowledge of how to advance the Company's interests they have so ably represented.

The meeting was held at the Company's offices, Decatur, Ills., beginning December 28th and lasting 2 weeks, during which time there was a regular programme of addresses on various subjects, discussions of points of the goods, business possibilities of 1909, etc. New goods which the Company will bring out were demonstrated, and their advantages explained, by the factory experts. The social side of the annual meeting was enjoyable, consisting of dinner and theater parties for the salesmen.

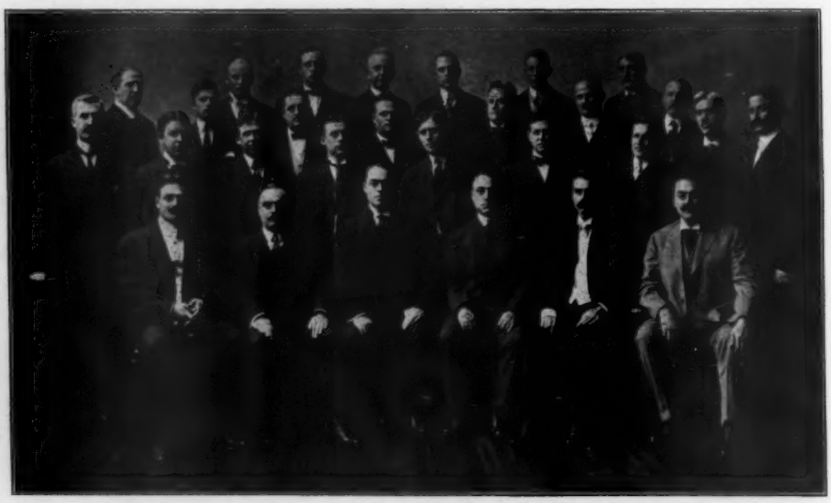
The annual meeting of the "49" Club was a hilarious affair. Four new salesmen got the degree—Messrs. M. G. Wasson, N. E. Sippell, E. B. Cameron and F. L. Hays, Jr. The members of the Club welcomed back to their ranks T. F. Leary, who was recently with the L. Wolff Company. He will be with the Mueller Manufacturing Company in the future.

The salesmen in the Western territory are:

| | | |
|---|---|---|
| Cameron, E. B. | Heinrichs, W. C. | Murphy, F. J. |
| Dill, W. N. | Kirkwood, M. F. | Rowley, D. D. |
| Ford, W. B. | Leary, T. F. | Smith, Jas. |
| Hamblin, S. E. | McCormick. J. H. | Wasson, M. G. |
| Hays, F. L., Jr. | Mueller, F. B. | Whitney, M. T. |

The salesmen in the Eastern territory are:

| | | |
|---|---|---|
| Caldwell, G. A. | Hennessy. W. F. | Pilcher, A. C. |
| Ford, C. T. | Kice, A. F. | Sippell, N. E. |
| Hastings, R. M. | McCarthy, W. F. | |



H. Mueller Manufacturing Company's Firm and Salesmen, 1908-1909—Reading from Left to Right.

Front Row.—O. B. Mueller, P. Mueller, A. Mueller, R. Mueller, H. Mueller, F. B. Mueller.

Second Row.—F. J. Murphy, W. B. Ford, W. N. Dill, A. F. Kice, W. C. Heinrichs, Jas. Smith, F. L. Hays, Jr., T. F. Leary, W. F. McCarthy.

Third Row.—Chas. Ford, E. B. Cameron, W. F. Hennessy, D. E. Rowley, M. G. Wasson, R. M. Hastings, M. T. Whitney.

Fourth Row.—S. E. Hamblin, N. E. Sippell, G. A. Caldwell, A. C. Pilcher, J. H. McCormick, M. F. Kirkwood.

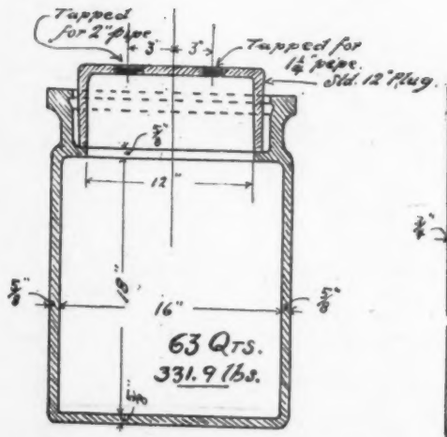
[Continued from Page 94.]

## Report of Progress of the Sub-Committee on Pipe Standards, American Gas Institute.

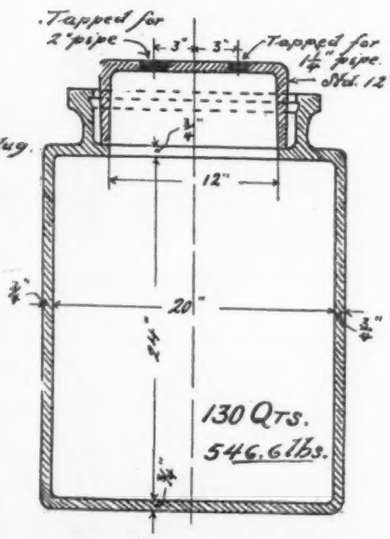
[Submitted to the Third Annual Meeting, American Gas Institute.]

In order will be found another installment of the illustrations going with the text of the above report. They are as follows:

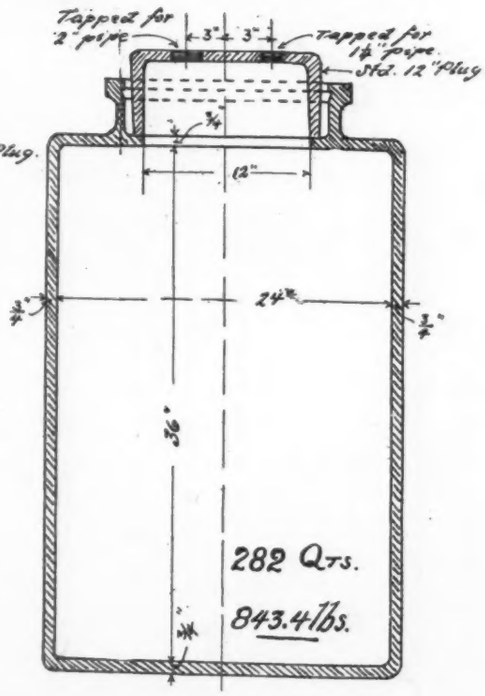
Proposed Cast Iron Side Pots.
" " Hat Flanges
" " Crosses and Tees, with 3-inch outlets.
" " Crosses and Tees, with 4-inch outlets.
" " Crosses and Tees, with 6-inch outlets.
" " Crosses and Tees, with 8-inch outlets.
" " Crosses and Tees, with 10-inch outlets.
" " Crosses and Tees, with 30-inch outlets.
" " Y-Branches.




For 3 inch to 8 inch.

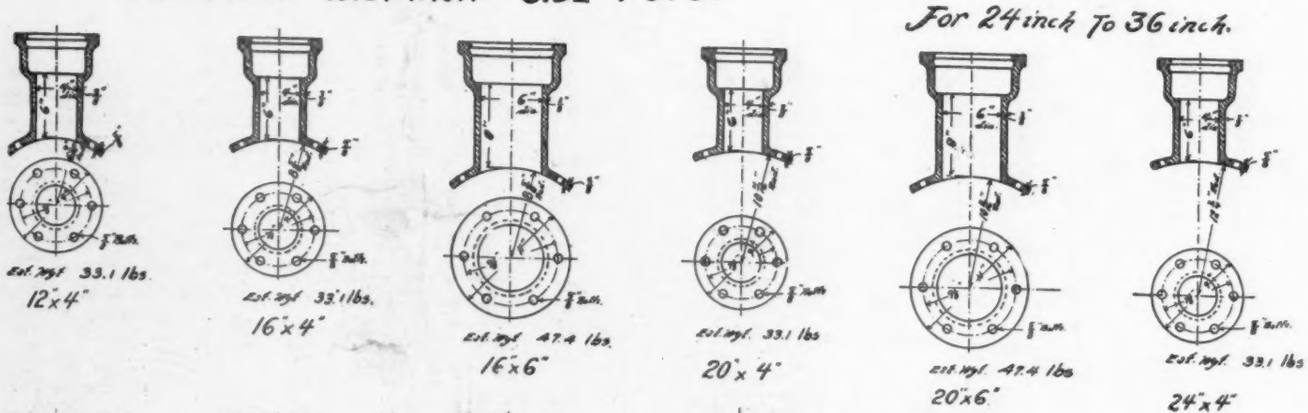


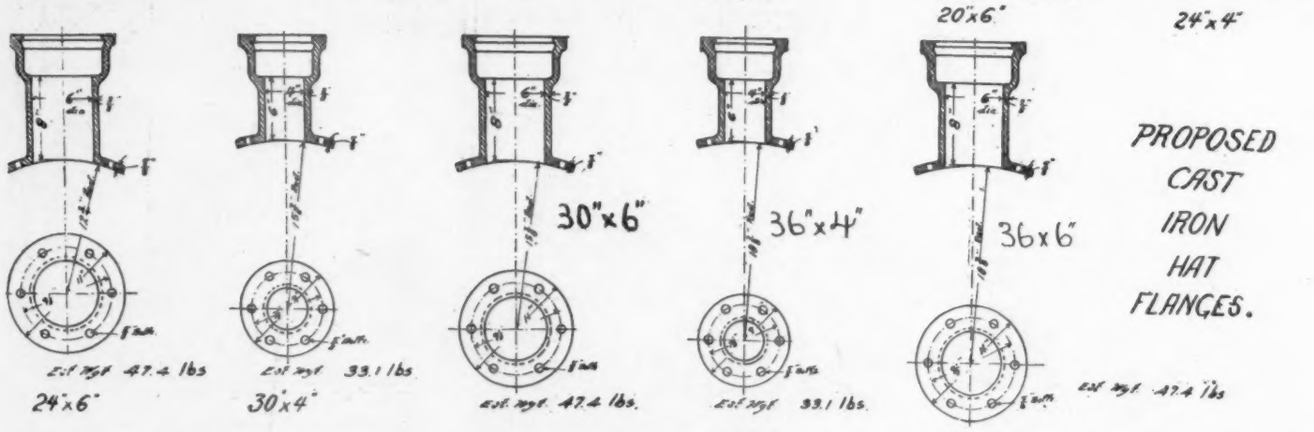

For 10 inch to 20 inch.



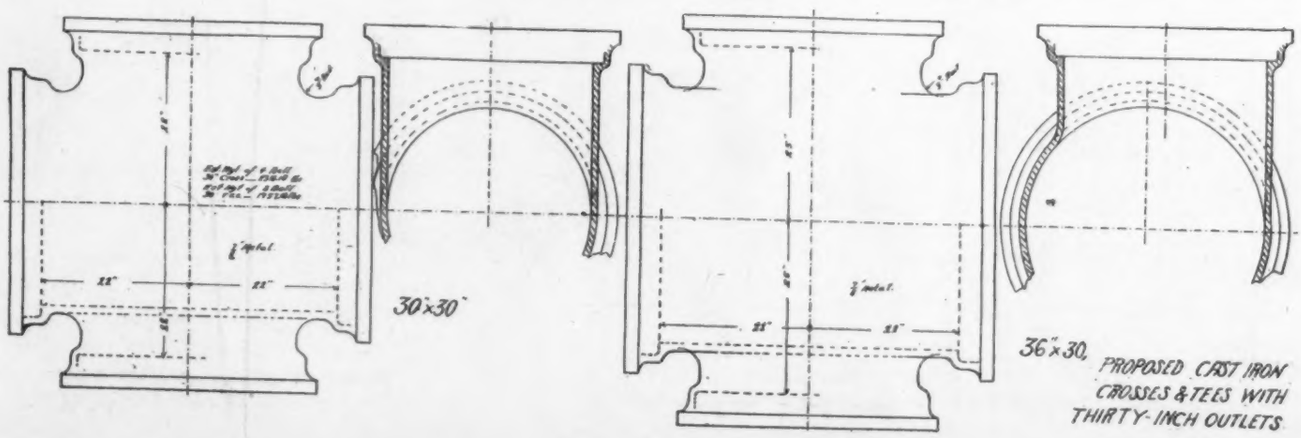

For 24 inch to 36 inch.

## PROPOSED CAST IRON SIDE POTS.

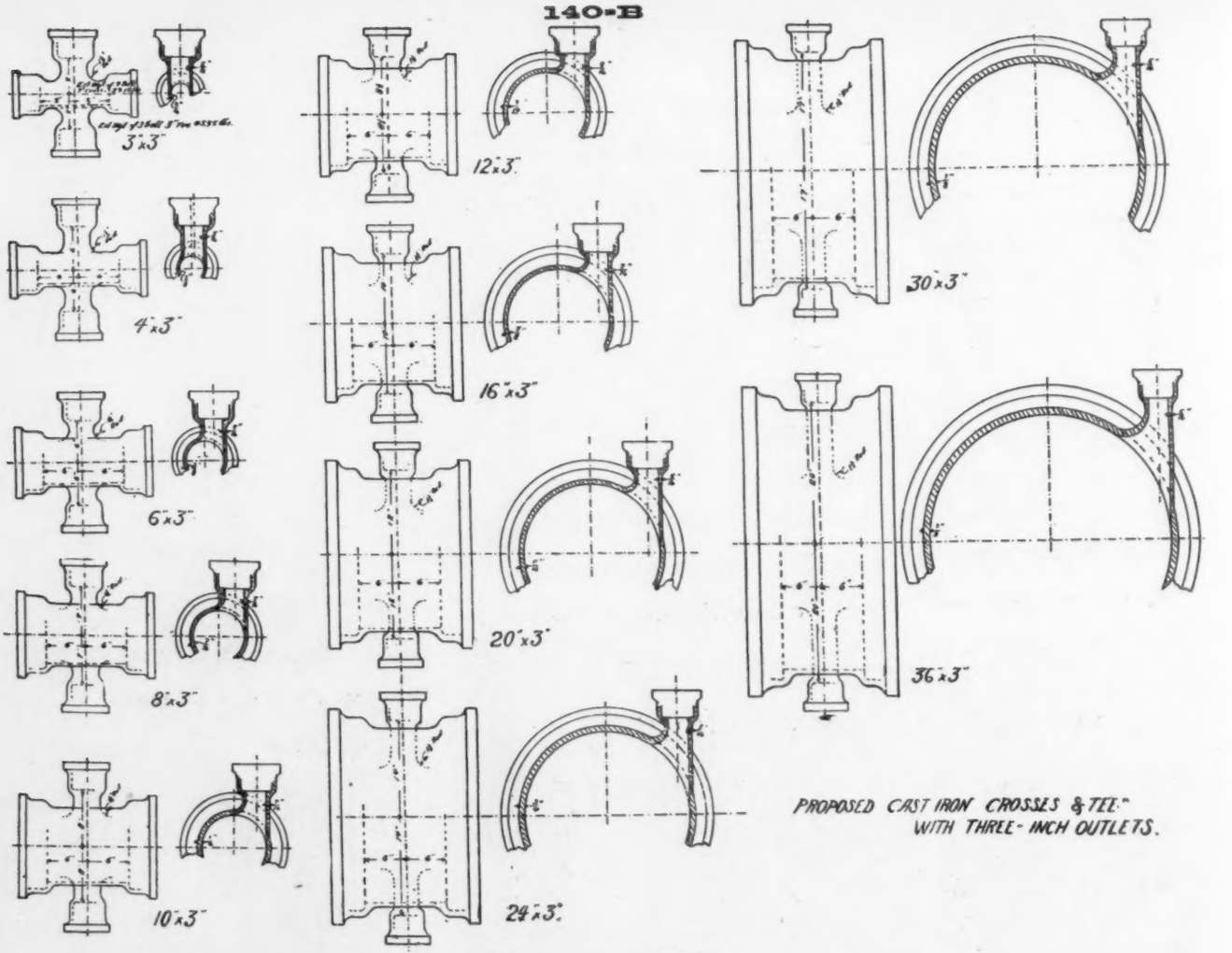



## PROPOSED CAST IRON HAT FLANGES.




PROPOSED CAST IRON CROSSES & TEES WITH THIRTY-INCH OUTLETS.

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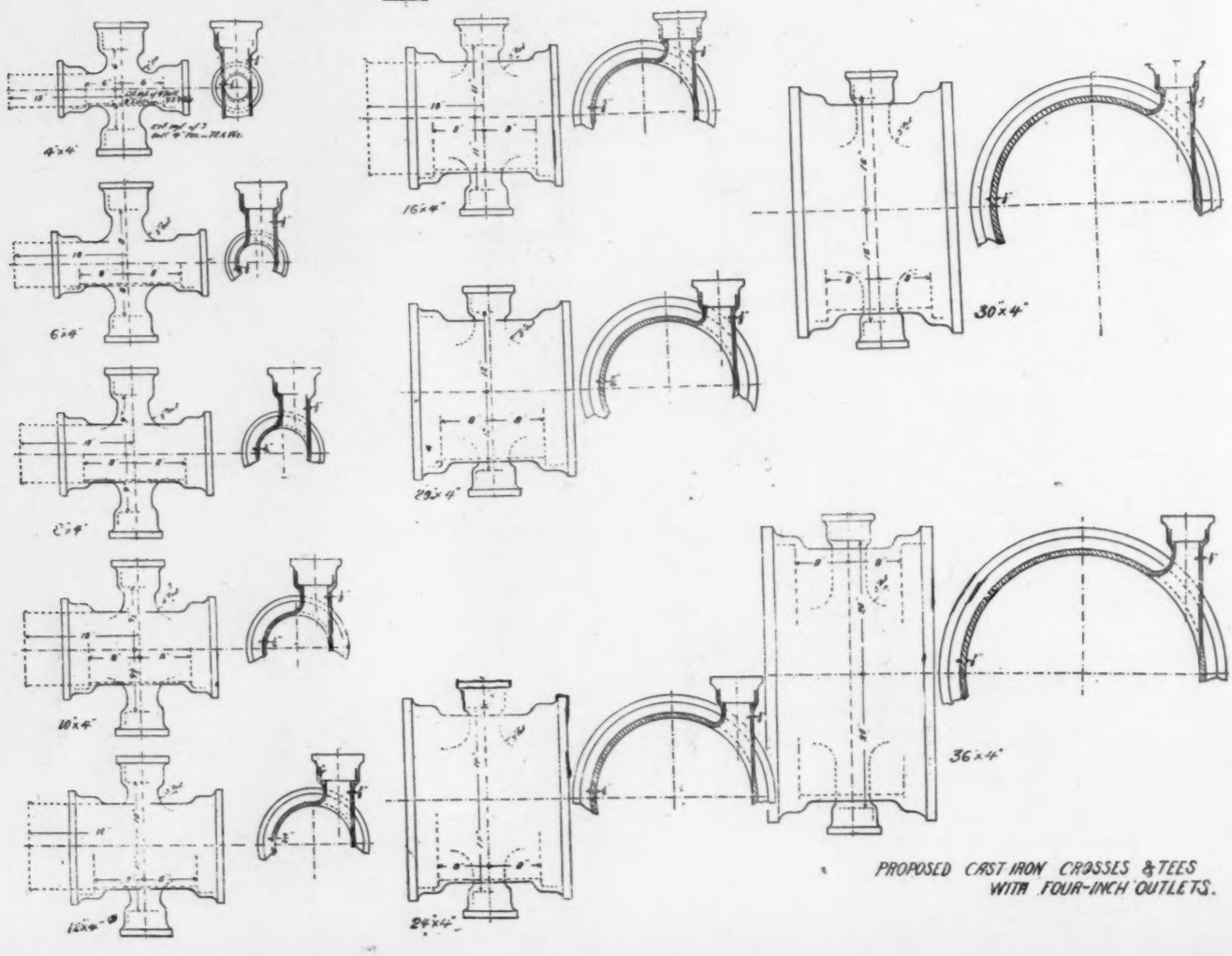


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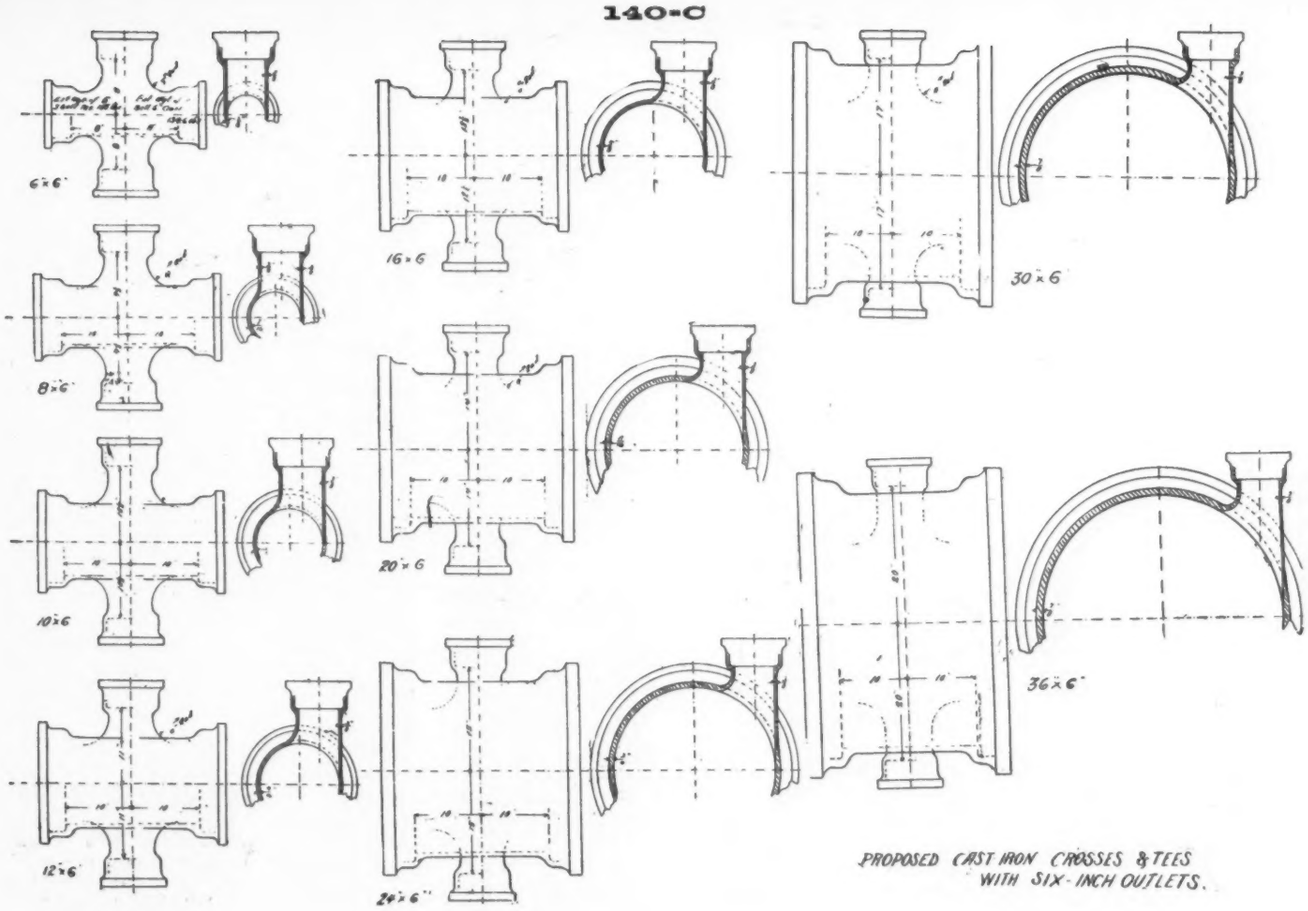


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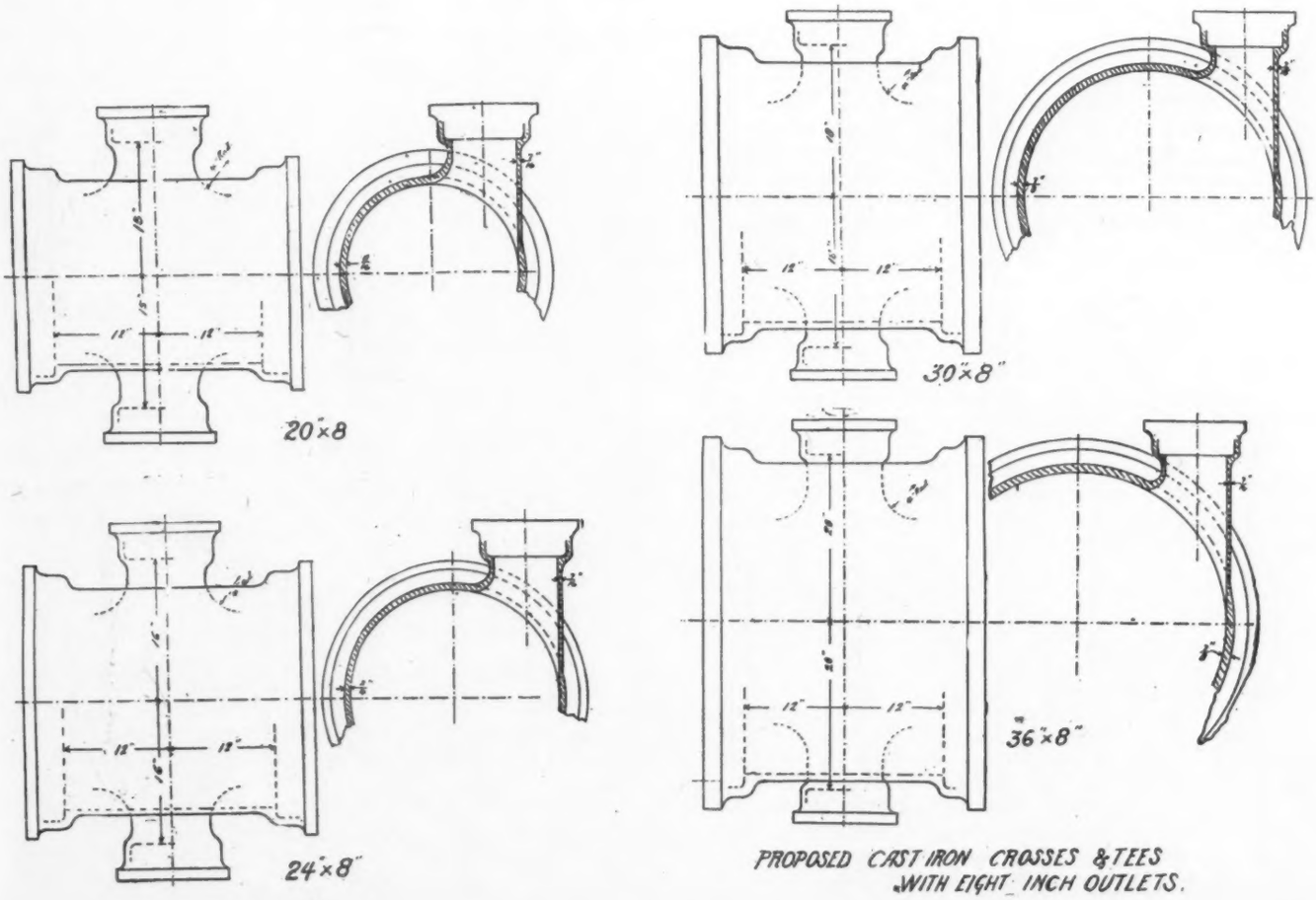
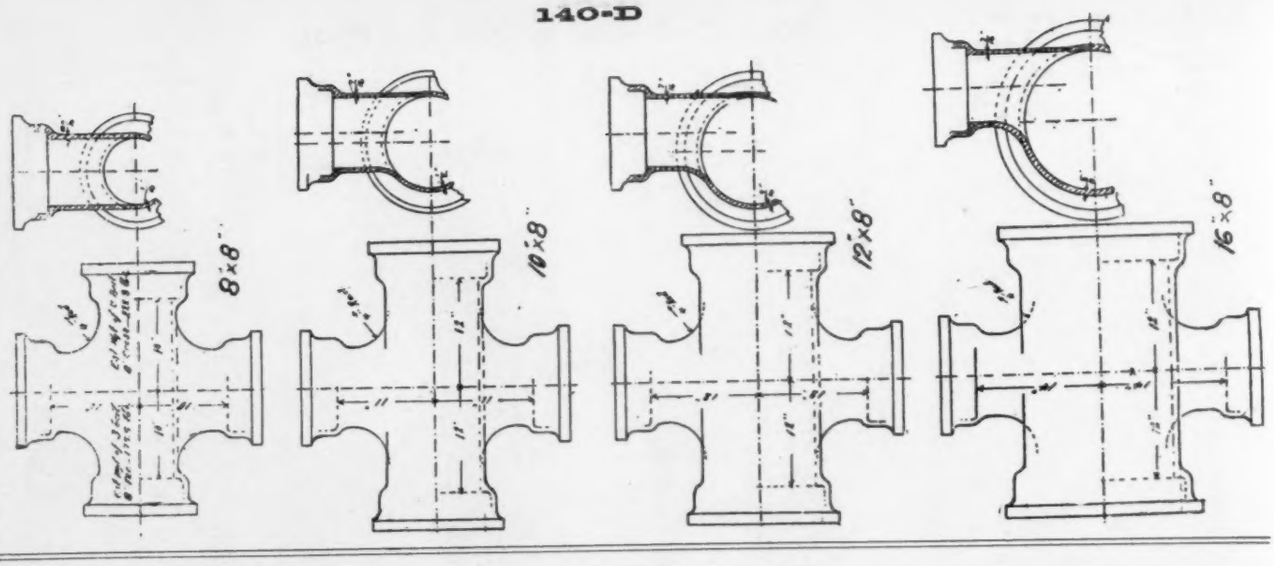
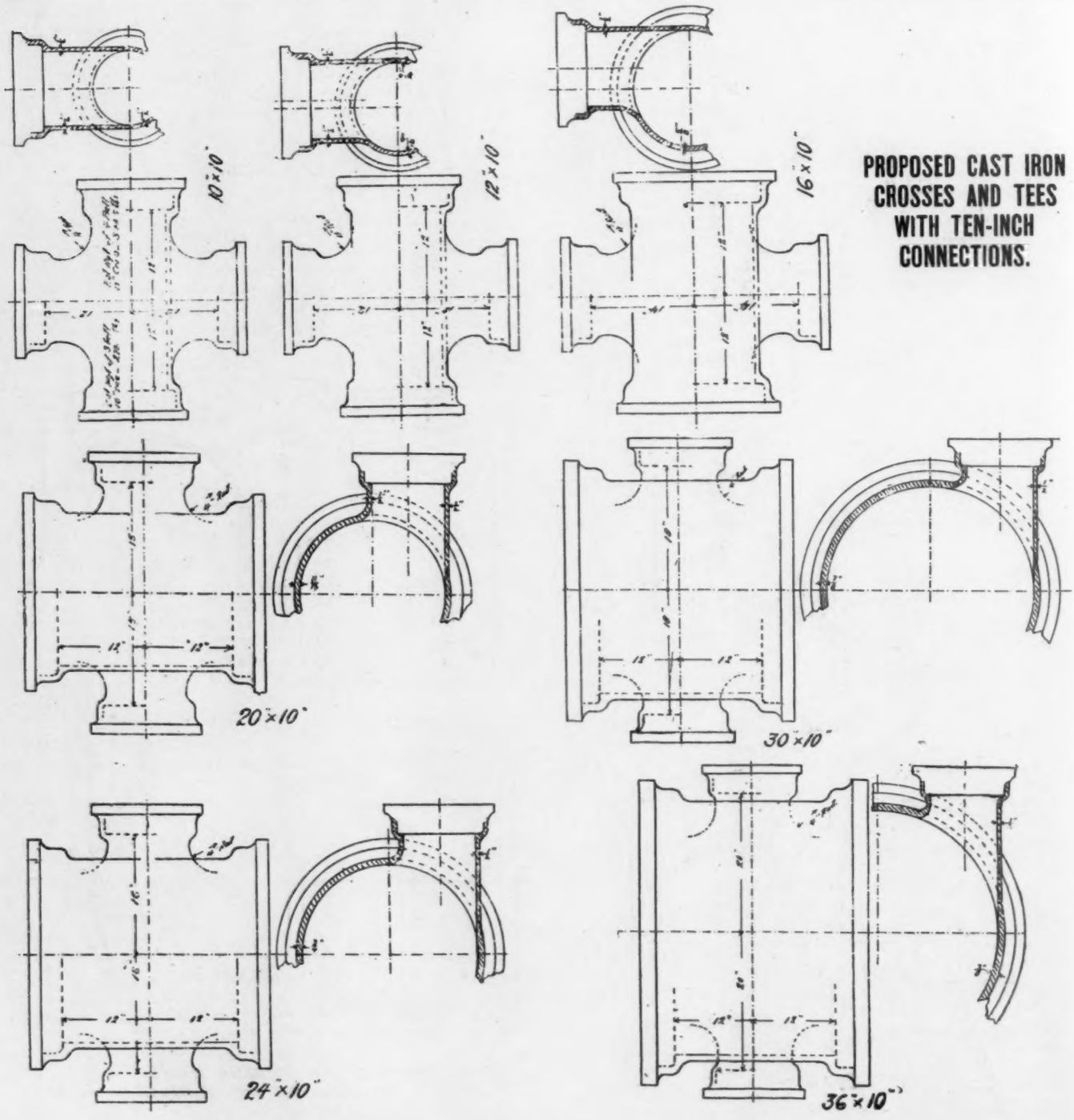
WITH SIX-INCH OUTLETS.



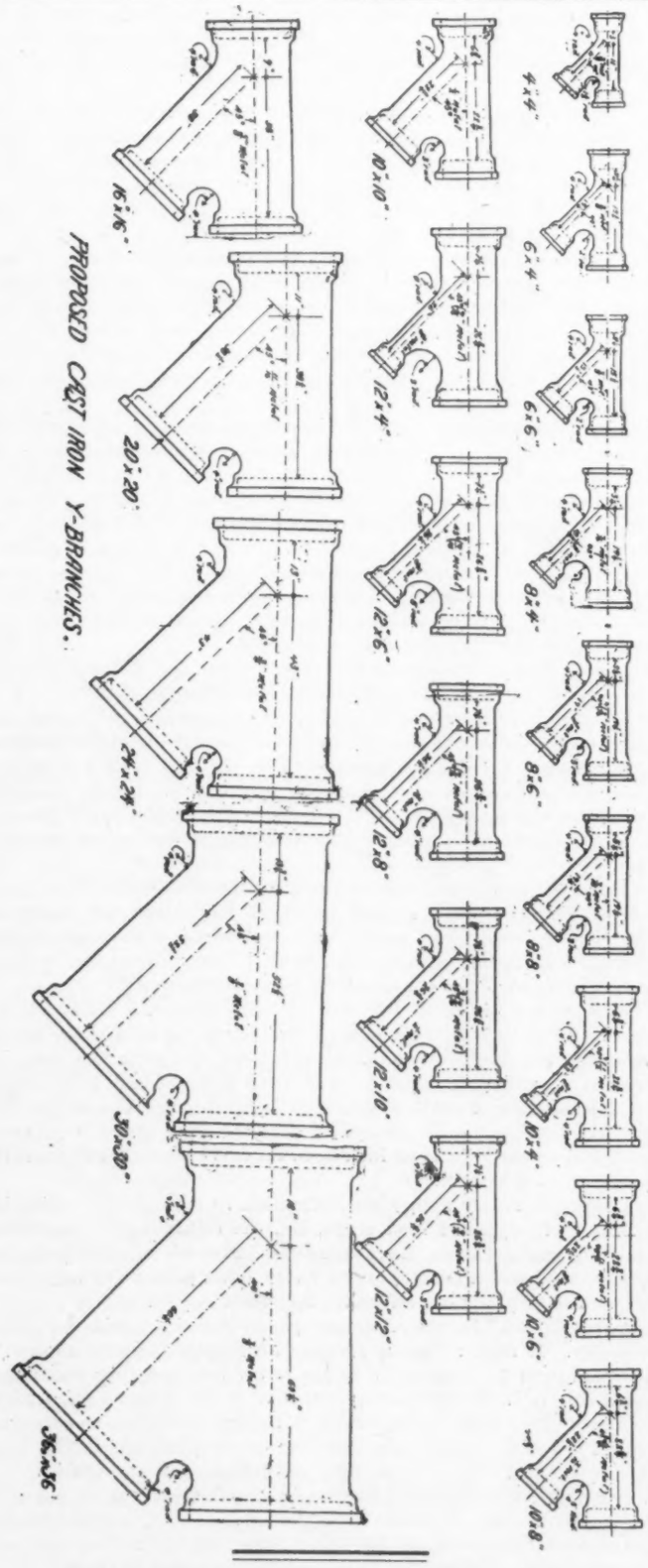

PROPOSED CAST IRON CROSSES & TEES
WITH EIGHT INCH OUTLETS.

*Proposed Cast Iron Crosses and Tees with 8 Inch Outlets Concluded.*




**PROPOSED CAST IRON CROSSES AND TEES WITH TEN-INCH CONNECTIONS.**




## Demonstration Work by Gas Companies.

[A paper prepared by MRS. HELEN ARMSTRONG for the Chicago Meeting of the National Commercial Gas Association.]

The word "Demonstrate" with us seems to have taken on an entirely different meaning by usage than that which is found in the dictionary. The definition as given is to prove by deduction or reasoning; to make evident; to show clearly; to point out or indicate. From this we see that it is not necessarily a physical exhibition as commonly understood, or as "cooking lessons" to the average gas man.

Any line of work proving the desirability of gas as fuel comes under this head. My province here is to demonstrate the field for women in the employ of gas companies; also, the means of interesting women in gas appliances. Here are some suggestions, the adoption of which would be dependent upon the size of the town:

1. An attractive display of ranges and other appliances in salesroom, with someone in charge who knows how to use same, is quite desirable. Extra exhibits during discount days might show the results of these appliances, such as toast, cake and bread, broiling and planking; also ironing. This gives an opportunity of securing names of interested parties for future reference.

2. Cards of instruction for use of range should be furnished with same, and others given out upon application. Have these tested on *your* gas, then revised if necessary. This should be done by a practical cook, who keeps accurate account of time while doing this work.

3. See that salesmen and fitters have practical instruction as to the uses of the range and general management of oven, adjustment of burners, care of range and economy of oven. This will insure uniformity of expression and correctness of argument, as satisfactorily proven by us in the Gas Company in Chicago.

4. See that church societies, and other women's organizations, are supplied with gas ranges, either free or at nominal cost. The benefit to be derived from this is evident.

5. There should be a periodical inspection of all such appliances to insure efficiency and satisfaction, with a charge when necessary. The condition of ranges, as often seen in such public kitchens, is truly deplorable.

6. Install gas in schools for teaching domestic science. If same is not in regular course make all possible effort to introduce it. Public opinion can be molded by influence, and the women interested in such a movement by persistent effort. The equipment for this work, with a cabinet range as well, should be furnished by the stove company. Chattanooga is to-day showing what can be done, even among the colored people.

7. Arrange for summer schools for cooking for housewives, utilizing public school kitchens, even when conducted in a very modest way. This will prove very effective.

8. Fit up a suitable space in the gas office for the convenience of women, with desk room, reading table, etc., as in up-to-date banks, utilizing a gas heater here to speak for itself. This room will prove useful and very popular.

9. Co-operate with any store demonstrations in which a gas range can be used. If the demonstrator favors a range not carried in your town, persuade her to make use of something from your own stock. Women are very apt to imagine that the make of range used is largely responsible for the excellent results shown in these exhibits.

10. Compel prompt and proper attention to all requests of customers who may ask your help. The old-time "complaint" desk is relegated among the back numbers. We are glad to adjust difficulties and remedy any defects, but the term "complaint desk," in itself, is an invitation to trouble.

11. Co-operate with hospitals, and secure the interest of nurses, who will readily appreciate the advantage of broiling facilities; a grilled chop, crisp bacon, well-made toast, nourishing soup and broth. The latter is only made possible by long, steady heat, much nutriment being lost when the temperature is not evenly maintained. Indianapolis has done remarkably well along these lines. Broiled bacon is one of the articles now prescribed by physicians to many convalescents, it being an appetizing form of fat readily assimilated and vastly different from fried bacon so commonly known. In small places it may be possible to install a temporary equipment of gas in protracted illness for the benefit of the patient and convenience of nurse. This practically insures its own permanency.

12. Encourage cooking contests with gas, as has been done particularly well in Milwaukee. The woman who takes pride in her cake making, and wishes to enter such competition, will gladly avail herself of her neighbors range, if needful, in order to do so. A few such experiments will convince her of the satisfaction of baking with gas. School girls also are glad to enter into such plans, and we must remember that they are all housewives in embryo.

13. Do not overlook any means of influencing the cooks in favor of gas, for their importance must not be under-estimated. They are apt to be set in their ways, and many of them feel that nothing can be accomplished unless a red-hot stove is in evidence. A cooking school for their benefit should be conducted part of the summer, and a question box for their use should be a permanent feature. It must, however, be handled by a practical cook herself, as any errors in replies

would be quickly discovered. No other one will discover a housewife's ignorance so quickly as her servant.

14. Co-operate financially with clubs or church societies who engage a lecturer in Domestic Science. This will prove a very material advantage and put the gas company in favor with these organizations. It is surprising how far a little money will sometimes go in this direction, as has been repeatedly proven in my own experience.

15. Women as inspectors for the gas companies prove a strong practical advertisement for gas as fuel, and New York and St. Louis afford good examples of the value of inspectors. (1) To follow up installment of ranges; (2), to respond to inquiries and calls; (3), to secure new business; (4), to put the business manager in touch with conditions. This last point perhaps is quite as important as any. Oftentimes difficulties which he might never reach can be located and remedied through this source. The inspector must be practical, well equipped for her position, both by training and personality, able to *listen first and then talk*. This sounds improbable, but it has been known.

1. Her first work, perhaps, will be to instruct in use of range in homes.

(a.) Teach the economy and efficiency of gas; the uses of various burners and how they should be adjusted.

(b.) The cleanliness and comfort of gas.

(c.) The possibilities of oven as to economy. The variety of dishes which can be cooked at one time in the oven, providing there is careful management, and doing away with odors which are noticeable if cooking is done on top of the range.

(d.) The use of the simmering burner, this being not usually well understood.

(e.) Teach that the oven door should be left open after roasting or any other cooking where moisture is created—this to avoid rust. It is also advisable under some conditions to leave the door open a few moments after lighting.

(f.) She must explain about the care of the range and how to keep it in condition, and do this without offense.

(g.) Have her teach the reading of the meter by cards, which should be supplied to the customers.

(h.) She must, of course, understand the construction of the range in order to explain how one burner will do as even baking as two; also radiation and ventilation of the oven.

1. Special instruction needs be given regarding the broiling facilities, as too many people utilize this space as a receptacle for flat irons, etc.

2. She should be in the office during discount days to answer questions about the ranges and other appliances, with exhibit of results when feasible. Inspectors would best make calls for oven tests by appointment; thus no time is wasted and no housewife surprised and disturbed in an untidy kitchen. It is important that the actual mixing of materials be done by the cook or housewife, or advantage would be taken of the inspector's ability in this direction. We have known of instances where women made it a point to call up the inspector when they wished an especially good cake. We cannot afford to be so philanthropic as that. Racine had some such experience, as undoubtedly have others who have tried it.

3. A woman of middle age will secure confidence more quickly than a young girl. A housewife resents being told how to cook by a person of youth and evident inexperience, however well trained. A stranger is preferable to a local person, first, because they will be less liable to criticism, and secondly, no time will be wasted in local gossip. She must be thoroughly interested in her work, which is, of course, a desirability in any position. She must be pleasing in manner, not easily ruffled or quick to take offense. She must be neat. This I consider an especial necessity. A young woman who is careless in her dress, or has untidy hair, has no business in a kitchen. She must be tactful and oblivious of kitchen sights, and however able to offer an opinion, she must avoid being officious. The chief objection to this admirable combination is that, other things being equal, they will probably be married by one of the company's men in a short time; but even this might be made advantageous. Work of this kind, if well done, should be well paid. It is nerve-wearing, and for this reason the hours should not be too long. If would be done best if never overdone.

Where the time is only partly required by the company, outside money is easily made by filling orders for baking, catering, etc. The company should, of course, see that the inspector has a good range for this work.

Model kitchens fitted up in gas office buildings are of untold advantage. A woman who has any interest in her home will see something here to attract her attention and make her realize her own needs. Kitchen cabinet and utensils may be secured at almost any cost from manufacturers, and this offers an excellent showing for various gas appliances.

Demonstration lessons, as generally understood, either by a professional or as given occasionally by company inspectors, have their uses so long as it is desirable to gain new customers, satisfy the disgruntled customers, teach economy to all customers, or interest and entertain the general public. Denver is a typical illustration of persistent effort to interest its female constituents.

A regular hour for consultation at the office will invite the confidence of women, and they will be glad to take advantage of this opportunity to make various inquiries regarding matters pertaining to the kitchen. It is, of course, of great advantage to have the hall for this work in the same building as the gas office. In this way we have them both "coming and going," as they said when we had this combination in Pueblo.

Gas offices can also be used for lessons occasionally in the evenings. As large a building as an opera house is usually unsatisfactory, because the audience is too far removed from the speaker to invite free comment and discussion. If women are allowed to ask the questions desired many points will be brought out which might otherwise be overlooked. Better have a smaller room well filled than a large room in which people are sparsely scattered about. It is, of course, a great mistake to confine such work to the spring and summer months. This is a point which the gas men are beginning to realize now. Gas as a hot weather fuel has been over-emphasized.

Special sessions for nurses, with talk on invalid diet and possible class work in hospitals, can be made truly valuable.

On various occasions certain clubs may be invited, or the lecturer furnished to church organizations, or the Young Women's Christian Association. This is often looked upon as simply a diversion, but results may amount to more than would be imagined. On one occasion, where we co operated with the Catholic churches, the priest himself told his parishioners that it was vital they attend these practical lessons.

A special invitation to high school girls often results in their showing a practical interest in cooking which they might not otherwise do. A brief, special talk on economy and the care of the range would prove a help in the practical education of the public at any of these demonstrations. Little Rock tried this most effectively.

Free lessons are often followed by paid ones, the salary of the teacher being paid by the company, the church conducting the work, retaining the admission fund. Cadillac did this some time ago. It is often a great inducement to give away a range, and I believe at the last meeting of the American Gas Institute a gentleman present was responsible for the statement that "women are the greatest gamblers on earth." Their interest in the raffle for a gas range easily justifies this statement.

The people really appreciate instruction in economical cooking in this day of expensive food stuffs, and the dishes should be neither elaborate nor expensive. Have instruction in the advantage of portable gas heaters, also kitchen heaters where other means are not available. The company can afford to place these at cost.

A recent "ad." in one of the gas papers certainly calls for some criticism. It reads: "Rusty ranges at low price; as good as new." It would seem to me that if they are as good as new they should be made so. It is simply calling attention to the one feature which women will criticize at once with, "If a range is going to rust like that it would be better in the gas office than in my kitchen." The ranges which I have seen in some gas offices in this country are a disgrace to the profession; rusty, dusty and often looking only fit for the junk heap. In many cases there are no ranges connected in the offices for women to see the proper flame and the various burners as they should be adjusted. This is certainly a *great* oversight.

Secure names of people at demonstrations if possible, without seeming over-anxious. If initials are given company can hunt up addresses.

Women in the employ of gas companies can be of very practical assistance in planning arrangement of kitchen furniture and appliances in new homes. They can also furnish suggestions in the remodelling of kitchens already in use. Such a person, well-qualified and full of the enthusiasm of her work, becomes a power in any community. In no other way can a gas company with certainty secure and maintain the goodwill of the housewife, the real head of the home. See that your employees in this line are furnished with the proper implements for their needs, then "Let the women do the work."

[No. I.]

## Report of the Public Service Commission, First District, State of New York.

The first annual report of the Public Service Commission, First District, giving figures on the operations of the lighting companies, is dated December 31, 1907, and was issued about a year later. The statistics are given up to June 30, 1907, 1½ years ago.

The report was evidently prepared for popular use, as the prominent features cover the ownership and magnitude of the operations of the companies in the city of New York, which is the territory supervised by this Commission. The report comprises nearly 300 pages of statistics on 25 companies, and, according to the Commission, one has to go to the four corners of the city to find companies not controlled or allied to the Consolidated Gas Company.

The intercorporate relationship, through stock ownership and dual directorate, is given in tabular form, and the relatively insignificant amount supplied by the independent companies is brought out by the figures given in Table I.

TABLE I.—*Showing Percentage Supplied by the Various Systems.*

| | Gas. | Electric Current. |
|---|---|---|
| Consolidated Gas Company's system | 70.48 | 75.93 |
| Allied systems and companies | 28.05 | 22.74 |
| Independent companies | 1.47 | 1.33 |
| Total | 100.00 | 100.00 |

The total quantity of gas sold represents 20 per cent. of the artificial gas sold in the whole country, and is divided, according to the users thereof, as shown in Table II.

TABLE II.—*Showing Sales in Greater New York for the Year Ended June 30, 1907.*

| Consumers. | Quantity, Cu. Ft. |
|---|---|
| To general consumers | 31,785,654,889 |
| For street lighting | 604,487,989 |
| To municipal buildings | 360,178,700 |
| Total | 32,750,374,981 |
| Used by companies | 135,890,970 |
| Total | 32,886,265,951 |
| Unaccounted-for | 1,801,908,117 |
| Total | 34,688,174,068 |

Of this total make Table III. shows:

TABLE III.—*Showing Total Make of Gas Manufactured in the City of New York.*

| | | |
|---|---|---|
| Water gas | 30,906,309,500 | cubic feet. |
| Coal gas | 3,750,612,800 | " |
| Total | 34,656,922,300 | " |

The unaccounted-for ranges from 3.03 to 21.61 per cent. of the total consumption, the average being 5.48 per cent. The minimum is credited to the Consolidated Gas Company, and for the same period it has surpassed Boston by over ½ per cent.

The percentage for the Consolidated system is, however, 4.89 per cent., and the average per mile of main 630,000 cubic feet, the last named figure being over 3 times that of Boston.

The company with the largest percentage of unaccounted-for also has next to the smallest number of meters per mile of main, while the Consolidated leads with 575; the average being 323.

The average sales per mile of main range from 1,403,000 to 17,983,000 cubic feet; and the average is 9,591,000. The average sale per meter was 29,000 cubic feet.

The meters through which this enormous output was passed and duly registered were divided among the five boroughs, as shown in Table IV., which also includes the number of consumers, both gas and electric as well:

TABLE IV.—*Showing the Total Number of Consumers and Meters.*

| Boroughs. | Consumers. Gas. | Consumers. Electric. | Meters. Gas. | Meters. Electric. |
|---|---|---|---|---|
| Bronx | 80,000 | 3,043 | 88,378 | 4,087 |
| Brooklyn | 294,000 | 11,700 | 294,608 | 16,847 |
| Manhattan | 575,587 | 65,300 | 652,184 | 82,406 |
| Queens | 40,000 | 3,000 | 42,691 | 3,138 |
| Richmond | 8,165 | 1,431 | 8,165 | 1,761 |
| Total | 997,752 | 84,474 | 1,086,026 | 108,239 |

## Gas Lighting.

[A paper prepared by MR. B. O. TIPPY, Grand Rapids, Mich., for the last meeting National Commercial Gas Association.]

Our President requested that, inasmuch as Grand Rapids has perhaps an unusual proportion of gas lighting, a paper be presented to this Association on how it was obtained.

Admitting the accusation for the sake of argument, although we dislike to go on record in such a seemingly boastful way, I will try to enumerate in a short word why our Company has obtained, and thus far, successfully held, approximately 85 per cent. of the lighting in the city in competition with what is considered cheap water power electric current.

Our Company was exceptionally fortunate at its birth, over 50 years ago, in its choice of a "father," so-to-speak. Its founder and controlling spirit for over 25 years was a man so highly regarded by the public that his likeness in bronze and granite now stands in our downtown park, a monument to his long life of public usefulness and philanthropy. Possibly few companies get as good a start as this. His successors have endeavored to emulate his exemplification of the "square deal," though, I may add, without thus far the visible sign of recognition on the part of the public. This, with the additional fact that all employees have always been painstakingly schooled in the business getting value of good service, has resulted in mutual confidence on the part of the company and its consumers. The Company has been a pioneer in the matter of low gas rates and along this line I find a statement made by a former manager to the effect that our city was one of the first in this country to enjoy dollar gas.

For over 25 years the Company has maintained a gas appliance department where a complete stock of gas lighting, heating and cooking appliances has been offered to the public with an adequate force of solicitors and maintenance men to help promote their sale and use. Nothing but the highest grade appliances are sold, an artistically appointed showroom being considered necessary to the proper presentation of such appliances.

A thorough canvass is made of the city twice a year, in which war is made on all inferior gas lighting, special attention being given to attractive lighting by means of artistic dining room domes, globes and other glassware. The canvasses are made by practical men who endeavor to leave every house with its appliances properly adjusted, cleaned and in good working order. Seven years ago a special plan was adopted, and has since been aggressively pushed, for the installation of illuminating, house piping and fixtures in buildings not under course of construction.

Under this plan 7,700 old houses, stores, etc., have been annexed for lighting purposes, and no building now goes up in the city that is not provided with the proper gas piping. New buildings are watched carefully, the piping for them being also done by us, if for any reason the plumbers do not see to it that this is attended to.

From the time Welsbach lamps and gas arcs came onto the market, we have given them regular weekly maintenance service in the commercial lighting districts, and "request maintenance" service in the residence districts. We have thus endeavored to always keep gas lighting appliances up to their highest efficiency. In fact, we feel that, without proper maintenance service, it would be useless to make the effort to get lighting, especially commercial lighting.

Practically every Welsbach lighting burner in the city is equipped with the so-called, self-lighting, by-pass attachment, which entirely does away with the gas lighting complaint, often heard, of its inconvenience as compared with electricity. This, of course, has taken years of gradual education, both on the part of the public in using them and the Company's employees in properly installing and caring for them. The price of a Welsbach light is always quoted to include the by-pass.

In closing, let it be understood that it has not been our intention at all to assume we are perfection personified; but I have tried to enumerate the reasons for having gotten along as well as we have. There is a world of opportunity for improvement in ours and every other company's methods, and I feel confident, were we not unknowingly blind to them, we would be able to increase our sales of gas, not only for illuminating purposes, but for every other use, to a surprising degree.

At any rate, with the many improvements being made in gas lighting appliances, we see no reason why, with good service, we should not continue to enjoy indefinitely the revenue from that branch of our business, which, while giving us the most concern, at the same

time gives us a large share of pleasure, this possibly because it is the "showy" part of our business, and there is a deal of satisfaction in successfully keeping up a good fight for that which our younger neighbor considers should rightfully only belong to him.

*Discussion.*

The President—Has Mr. Butterworth anything to say upon this subject?

Mr. Butterworth—I have not anything especial to say. If any of you gas men want to see what can be accomplished by gas lighting in a city of fairly large size, it would do you all good to visit Grand Rapids and there spend a few days and nights looking at the gas lighting there. I think gas lighting has reached its acme in Grand Rapids. Eighty-five per cent. of the city uses gas, and out of 15,000 houses in the city, less than 1,000 are lighted with electricity. They are selling 7,600 feet per capita of gas per year. Detroit, four times as large, should sell more gas per capita, but they are only selling 6,850 feet against Grand Rapids' 7,600. I think, as I said before, if you want to see the best gas light you should go to Grand Rapids.

Mr. Gifford, East Pittsburgh, Pa.—I think that, with this paper and the one preceding it, a little definite information should be put into the records later on as to the cost of the various classes of maintenance. Possibly this gentleman might be able to give them to us, especially in regard to the maintenance of house burners.

Mr. Hunting—One, and the strongest, of reasons that Grand Rapids has that consumption, we are told in the beginning of the paper, was a good man to start and stay with it 25 years; but we have not been told as to the good men who have been and stayed with it the last 25 years. It seems there is a reason there. Why cannot all our gas companies put to the front such good men as they have there. It is the popularity of the men in control of the companies much more than we imagine, that influences the sale of gas. I maintain with our solicitors that they should represent the company in their territory as the manager represents the company to the city at large. So we want to pick up a good manager, not only of good appearance, but a good mixer. A man known all over the city, who will get and keep business which won't go away from you when competition sets in. Our representatives must represent us in the territory where they are located in the same ways. I think that what has been brought about in Grand Rapids can be accomplished anywhere else. If the gas company is popular it can pick up business in the same way they have there.

Mr. Norcross—Mr. Tippy states the maintenance was free of charge to consumers. I would like to have that explained.

Mr. Tippy—The residence maintenance is free of charge, except that for the mantle. If anyone is in trouble in the residence section we take mantles up, fix and adjust them, but charge only for the mantles used. Also, in our maintenance in the city, we endeavor to leave every appliance in good working order. We do not charge for the men's services; only for the material.

Mr. Clabaugh—I think one of the most important things brought out in this paper is the awakening of gas men to a view of the illuminating business. In years past we let the electric people get ahead of us, while we were pushing gas appliances for fuel only. We all thought we were pushing the illuminating end. I am glad to see a paper of this kind that will awaken gas men to a full value of their product, and there is no reason in the world why the electrical people should surpass us in any way. It is true many consumers prefer electricity regardless of cost, but we must remember that we cannot get everybody. Competition has been the very best thing for the gas companies that was ever brought into any line of business. It was not many years ago, certainly within the remembrance of all who are here, before electric light was known. Gas companies were lax. They cared nothing about their business success, and the attitude generally was that the consumer can go to —— or some other region and burn oil if he does not want gas; but when the electric light was put on the market it opened the eyes of those who had been sleeping, very much like China is to-day; and from 1878 to 1890 the gas world has been awakened, until now it is fully awake. But it is only awake to a realization that the electric company has stepped in and taken the business from it, which it would have had all this time; but it is never too late to mend. Therefore, it behooves us to start to-day and follow the recommendations laid down here by the gentlemen in these papers, particularly the one on illumination, and we can get a great deal of business and maintain it. I disagree with the gentleman who spoke a little while ago as to cost, and think that is one of the strongest features and arguments we can possibly make to the prospective consumer, for when you strike a man's pocketbook, you strike his business integrity. You may say that electricity will cost him more money than he pays for gas. I think this will appeal to the majority of people and we want the majority. Grand Rapids has 85 per cent. So get out and do work forwarding the illuminating end. Do not give up the fuel end by any means, but the gas range now is in the nature of a necessity. It is not a luxury. In Omaha they are building house after house without any chimney, and that means they will have to use gas stoves there. If we work with the architects we can soon settle the question of fuel gas and have more time to give to the illuminating end.

## Dodging Regulations and Fooling the Inspector.

By Mr. W. E. Partridge, in *Metal Worker.*

The journeyman plumber sometimes thinks it is very smart to dodge the regulations because in doing so he fools the inspector. In doing this he makes several mistakes. The regulations in regard to the weight of pipe, methods of making joints, repairing leaky and cracked pipes, and many other things relating to practical details of work, were all made by practical men, by experienced plumbers who were first-class. The rules were formed so as to insure first-class work, and as they were making the rules for themselves they did not make them in such a way as to increase the cost of workmanship.

*Saving Lead in Joints.*—In olden times when plumbing rules were new the journeyman said to himself that there was no reason for putting ¾ pound of lead per inch diameter into the hub of an extra heavy pipe, so with some old newspapers in the bottom and oakum on top of that, he filled up the hub until a thin ring of lead filled the hub approximately flush. This took rather more time than putting in the ordinary quantity of oakum. The thin ring of lead required very careful calking and sometimes had to be taken out and poured a second time. But in the end he effected a saving of 1, 2 or 3 pounds of lead, according to the size of the joint. This gave him great satisfaction. On one occasion where work of this kind had been done it was brought to the attention of the boss plumber, who happened to be of the type known as a "skin." He had no love for inspectors or rules, but he remarked in regard to the work: "Didn't the fool know that while he was saving 12 cents worth of lead he wasted 25 cents worth of time?" There are a great many such economies in plumbing. Savings can be made in the expenditure of material, but they cost more than they are worth. With a thin ring of lead, unless unusual care has been taken with the oakum, the lead will sink in places, being driven down before it expands so as to fill the joints. Where a line is subject to a water test, a few such joints will cost perhaps twice as much in time as though it had been made in the regulation way.

*Fixing Up Cracks.*—Cracked lengths, cracked hubs, blowholes that cannot be plugged, and other similar defects, are often put in place with the hope of getting them by the inspector. If they are discovered the usual song is, "We didn't see them," or, "We hadn't noticed them." Such an answer would pass muster if the blowholes were not always carefully turned so as to bring them out of sight. It is far better for the master plumber frankly to condemn such a pipe and refuse to put it into the job than it is to run the risk of having to take the defective pieces out.

In a big double apartment house on Fortieth street in New York, where it was expected that the finest kind of work was being done, a 10-inch Y was necessary in the house drain to bring the main soil pipes together under the cellar floor. It was the practice at that time to have the house drain plugged and to call for the water test, and with 5 or 10 feet head, the water was required to keep its level for 10 minutes. The Y was put in and it was cracked. The head man on the job knew it. The ditch became so wet that it was out of the question to get into it to examine the joints. The house was located well up on Murray Hill, but the plumber gave as an excuse for the wet ditch that the tide rose and fell in the cellar. Two inspections were made and the pipe was found to leak. The cellar work was greatly delayed and the inspector was called several times, but found the water was leaking out of the pipe too rapidly.

Finally a notice was sent saying that everything was tight, but a minute or two after the inspector arrived it commenced raining. As the leaders were connected this put an end to the test. Then the plumber out of patience with his man called in the chief inspector and asked for an examination. No work was going on in the cellar and the plumber and two or three inspectors started down into the mud, and one of them found a lighted furnace sitting on the Y in

question. This was suspicious. He lifted it away and found the joint leaking. The chief inspector said to the plumber: "Call your man and have that joint made tight." With that everyone went up the ladder to the first floor. Not a blow was struck, but in half a minute the journeyman shouted out: "I have cracked that Y trying to make it tight." That cracked Y had been delaying the work for 2 weeks or more because the journeyman had not the courage to tell. He had meantime spent much time in arranging a barrel of water on the roof with a drip leading into the soil pipe. By much experiment he had arranged the drip so that it would be just equal to the leak in the cellar drain. The rain came up just as the inspector was making the test and destroyed his scheme. The time, in that particular incident, which was wasted was probably four times the cost of the Y and its replacement.

# Bureau of Information, The American Gas Institute.

BUREAU OF INFORMATION,
THE AMERICAN GAS INSTITUTE,
HEADQUARTERS, 716 LOCUST STREET, ST. LOUIS, MO.
W. A. BAEHR, Chairman.

### OFFICIAL REPLY TO QUESTION NO. 41.

Chairman W. A. Baehr incloses the following official reply to Question 41:

*Question No.* 41.—"What is the difference in the number of candles of light obtainable from a gallon of kerosene oil as used in coal oil lamps, for illuminating purposes, and 100 cubic feet of 16-candle power gas?

The question in itself does not state whether the horizontal candle power or the mean spherical candle power is wanted, nor does it state in what kind of a burner the 100 cubic feet of gas should be burned. Owing to the absence of the above explanations on the part of the question, we assume that the information desired is the horizontal candle power, and the burner to be used is the standard test burner. The answer to the question was compiled along these lines, also assuming time of burning to be same for both kerosene and gas, viz., 1 hour:

The following is a comparison of the number of candles of light obtainable from a gallon of kerosene oil burned in a flat-wick burner, also in a round-wick burner, and 100 cubic feet of gas burned in a standard test burner.

One gallon of oil burned in flat-wick lamps will give 733-candle power.

One gallon of oil burned in round-wick lamps will give 1,100-candle power.

One hundred cubic feet of gas (19-candle power) = 360-candle power.

One hundred cubic feet of the above gas burned in a good Welsbach burner would, in regular service, give an illuminating power 5 or 6 times as great.

As to further literature regarding this subject the Bureau wishes to call attention to a paper, by Dr. A. H. Elliott, Chemist of the Consolidated Gas Company, of New York, read before the annual convention of the Illuminating Engineering Society. Inasmuch as data on such subjects as this naturally varies somewhat, the Bureau wishes to call attention to the two Answers-at-Large submitted to this question.

### ANSWERS-AT-LARGE.

*By Carroll Miller, M.E., Consulting Engineer, Pittsburgh, Pa.*—One hundred cubic feet of 18-candle power gas will give 360-candle hours, when consumed in a flat burner, and about 2,000-candle hours, in an ordinary incandescent burner. One gallon of kerosene oil (sp. gr., 790) will give 889-candle hours in a flat flame lamp, burning at the rate of 2.4 oz. per hour, and 946 in a round-flame lamp, 4.57 oz. per hour. Tests made in 1895 by Messrs. J. P. Kennedy and Carroll Miller, at the East River Gas Company.

Mr. A. R. Egeler (*Journal of Gas Lighting*, Jan. 1, '07) gives 56 grains per candle for a circular burner, 1.54 oz. per hour, which figures about 860-candle hours per gallon.

### ANSWER-AT-LARGE.

*By Mr. C. B. Gamble, Omaha, Neb.*—Below is a report on test of kerosene lamps:

*Round-Wick Lamp*, "*Rayo*."—Length of test, 10 hours.
Average candle power, 28.15.
Weight lamp, beginning of test, 2 pounds 8¼ ounces.
" end " 3 pounds ¼ ounce.
Put in 1,680 c.c:
8.25 c.c. weighs ¼ ounce.
Oil burned 1,680 — 272.25 = 1,407.75 c.c.

$$\frac{1{,}407.75 \quad .061}{231} = .372 \text{ gal.}$$

$$\frac{28.15 \quad 10}{.372} = 757 \text{ candle hours per gallon of oil, or for 10 cents.}$$

*Flat-Wick Lamp.*—Length of test, 10 hours.
+ Average maximum candle power, 9.44.
× Average mean horizontal candle power, 8.14.
Weight of lamp, beginning of test, 3 pounds ¼ ounce.
" end " 3 pounds 1 ounce.
Put in 360 c.c. oil:
Oil burned, 360 — 8.25 = 351.75 c.c.

$$\frac{351.75 \quad .061}{231} = .0929 \text{ gallons.}$$

$$+\frac{9.44 \quad 10}{.0929} = 1{,}010 \text{ candle hours per gallon of oil, or for 10 cents.}$$

$$\times\frac{8.14 \quad 10}{.0929} = 874 \text{ candle hours per gallon of oil, or for 10 cents.}$$

This latter figure is obtained by using the mean horizontal candle power.

*Question No.* 40.—"Does any apparatus exist by which ordinary illuminating gas can be used in connection with the "Prest-O-Lite" tanks for furnishing illumination for automobiles?"

### OFFICIAL ANSWER TO QUESTION NO. 40.

It appears safe to say that, at the present time, no apparatus exists by which ordinary illuminating gas can be used in connection with "Prest-O-Lite" tanks. The storage of acetylene in Prest-O-Lite tanks is not in the true sense compressing the gas, but rather charging it in the presence of acetone. The solubility of acetylene in acetone is what makes this process commercially possible. The solubility of ordinary illuminating gas in acetone is possible to a very slight extent only, inasmuch as acetone absorbs carbon monoxide, hydrogen and methane, the three chief constituents of ordinary illuminating gas, to only a fraction of its own volume. On the other hand, acetone dissolves approximately 24 times its own volume of acetylene at ordinary temperature and pressure, and continues to dissolve it in the same proportion as the pressure increases, until the point of liquefaction is reached.

The cylinders as now supplied are filled with porous absorbent disks; these are saturated with acetone in an amount equal to about 43 per cent. of the volume of the cylinder. The cylinder is then charged with acetylene to a pressure of about 10 atmospheres, at which pressure it contains approximately 110 times the volume of acetylene available for use in comparison to its total capacity at atmospheric pressure.

The storage of Pintsch gas in tanks may be taken as the nearest approaching condition under which ordinary illuminating gas would have to be stored. For a given size cylinder, only $\frac{1}{10}$ the amount of Pintsch gas can be stored at 10 atmospheres pressure than is the case with acetylene in the presence of acetone. It would, therefore, follow that an ordinary illuminating gas, if stored under a pressure of 10 atmospheres, would be practically stripped of its illuminating value, unless it were charged in the presence of some solvent that would make possible the storage of a greater quantity than could be compressed, without the loss of candle power.

The discovery of some chemical compound, which would have the dissolving powers for the various constituents which go to make up illuminating gas, would be necessary before it would be possible to handle ordinary illuminating gas apparatus at all comparable to the "Prest-O-Lite" tanks.

### ANSWER-AT-LARGE TO QUESTION NO. 40.

*By the "Prest-O-Lite" Company, per M. Moskowitz, Engineer, Indianapolis, Ind.*—We note Question No. 40 in "Progressive Age," of January 1, in the Bureau of Information column, and beg leave to answer same as follows:

1. The actual available space in the standard "Prest-O-Lite" cylinder, packed with porous asbestos, containing absorbent liquid, is nearly $\frac{1}{5}$ of a cubic foot, so that it would require 20 atmospheres pressure to get into these tanks no more than 2 cubic feet of city gas,

the absorbent liquid being totally unsuited for any gas other than acetylene.

2. Even if as much city gas could be put into the cylinder as is possible with acetylene, the lack of any suitable apparatus making it possible to use manufactured gas in automobile lamps, and the relatively lower candle power of manufactured gas per foot, as compared to acetylene, would render it out of the question.

We trust this party does not undertake to tamper with Prest-O-Lite tanks, as he is liable to hurt himself doing so, it being apparent that he knows nothing about the subject.—The Prest-O-Lite Company, per M. Moskowitz, Engineer, Indianapolis, Ind.

*Question No. 44.*—"Do you know of any good formulæ for manufacturing a paint out of pure coal tar for iron or steel? Also, can you give any information as to whether a tar paint is injurious for the above metals? Will you also designate whether any of the components of the paint formulæ furnished are intended to neutralize any acids which may be in the paint?"

### Official Answer to Question No. 44.

The answer to the above question was compiled by obtaining information on the subject from an expert on the manufacture of paint.

In submitting the answer the Bureau wishes to call attention to the fact that, in the manufacturing of all varnishes, it is necessary that the maker be thoroughly familiar with the work, as the danger of ignition of explosive vapors is very great. Because of the danger involved it would be well for anyone desiring to go into this subject to communicate with some varnish or paint manufacturer.

The formula for the manufacture of the coal tar paint submitted is as follows:

"Put into a 220-gallon 'iron black varnish kettle' 400 pounds of coal tar, neutralized with a small quantity of coal tar pitch, 200 pounds of 'F' Rosin, 120 pounds of raw linseed oil and about 20 pounds of black oxide of manganese. Cook until, when dropped on a piece of glass, will dry hard and brittle, then cool to about 250° F., then add slowly at first about 100 gallons benzol, or 62° benzine or turpentine. (The benzol will probably produce the best paint.) If material is required to be made more elastic, use more linseed oil. In thinning down with the benzol or its equivalent, great care should be exercised and the adding of the thinning stopped the moment white fumes or vapors commence to flow."

The above varnish can be applied to iron or steel and will not have a corrosive effect. Lime is added, if necessary, to neutralize any acid which may be in the coal tar pitch. This is generally considered as very essential. In some cases Portland cement is used instead of lime. It is doubtless sufficiently alkaline to serve the same purpose as the lime in neutralizing the acid.

In connection with the Answer-at-Large, submitted by Mr. Carroll Miller, it may be stated that with the tar paint he describes, leaky tin roofs were made water-tight; on the worst places a coat was applied, then muslin was stretched over the wet paint and, after drying, an additional coat of paint was applied over the muslin. Temporary buildings have had their roofs made water-tight and sightly. This coal tar paint will unquestionably stick to and thoroughly cover galvanized iron.

The data, instructions and discussions as given by Mr. Miller, were published in *Engineering News*, July 12, 1906; August 16, 1906; August 30, 1906; September 19, 1907.

### Answer-at-Large.

*By Carroll Miller, M.E., Consulting Engineer, Pittsburgh, Pa.*—It is claimed, and has been fully demonstrated, that the following mixtures contain no acids which injure iron:

| | Coal Tar. | Portland Cement. | Kerosene Oil. |
|---|---|---|---|
| New Orleans mixture.... | 8 | 1 | 1 |
| Annapolis mixture..... | 16 | 4 | 3 |

The Portland cement should, first, be carefully stirred into the kerosene oil, forming a creamy mixture. This mixture is then stirred into the tar, which must be free from water. The paint must be freshly mixed and kept constantly stirred when applying. (American Gas Light Journal, Oct. 1, '06.) The cement neutralizes the acids. There are many good paints made from tar oils, pitch and other products of distillation.

Chairman Baehr also forwards the following: Will you kindly publish the following notice in regard to Question No. 10, Bureau of Information, which reads as follows:

"Can the Bureau of Information inform me if there is any particular kind of anthracite broken coal particularly adapted for water gas manufacture? If so, from what region or vein is this coal mined?"

Information is at hand that the data for the above question will be completed in about 2 months. The answer will be duly published at that time.

## Items of Interest
### From Various Localities.

Mr. William Bailey, formerly of Anniston, Ala., has been appointed Superintendent of the Canon City (Col.) Gas Company, vice Mr. W. T. Fullagar, resigned.

"W. R. M.," writing from Detroit, Mich., under date of the 15th inst., incloses the following: "At the annual banquet of the Thornapple Gas and Electric Company, of Hastings, Mich., recently held in the Parker House, the participants were Mayor Weissert, the City Council, and the employees of the Company. Manager Plaice acted as Master of Ceremonies, and a right good Master he made. Some clever speeches were made, but perhaps Manager Plaice contributed the most interesting one, even if it dwelt largely with facts and figures. His remarks anent the year's work showed that the Company was serving 1,210 customers. Of these 774 were taking electric current on lighting account, and 48 on electric power account. The gas takers numbered 436. He also announced that in short time an announcement of rate reductions in both branches of the service would be made. Another especially noteworthy feature of the reunion was the distribution amongst the employees of gold coin netting in value $150."

At the annual meeting of the Grand Ledge (Mich.) Gas Company the results reached in the choice of officers were: Directors, J. D. Summers, Cassius Alexander, E. E. Edwards, R. A. Latting and A. E. Russell; President, J. D. Summers; Vice-President and General Manager, E. E. Edwards; Secretary, C. Alexander; Treasurer, A. E. Russell. It was determined to change the generating apparatus to provide water gas; also to construct a storage holder.

The gas service of the Wilmington (Del.) Gas and Electric Company, to the adjoining district of South Wilmington was satisfactorily commenced the evening of the 13th inst. It is likely the Company will this spring construct a new holder on a plot recently purchased close to Elm Park for the better supply of the outlying districts and for the eventual supply of New Castle. Truly, Manager Mitchell and his men are always on the moving side when the Company's interests are concerned, and they surely are abetted by that Prince of Merchants, Mr. James Dobson.

The H. M. Byllesby Company, as an earnest of the past and a token of the future, concerning their direction of the operation of the Consolidated Gas and Electric Company, of San Diego, Cal., and of the Oklahoma City Gas and Electric Company, have announced the payment of a quarterly dividend of 1¼ per cent. on the preferred stocks thereof.

The minimum rate of $12 per annum, recently established by the Middleboro (Mass.) Gas and Electric Works, is causing much discussion and not a little ill feeling. However, this is a matter which must be worked out by the politicians, since the gas and electric supply of the city named is conducted on municipal account.

We are indebted to Mr. R. V. Blanchard, of New Orleans, La., for the following from a recent issue of the N. O. *Picayune*: "To give the Seniors taking the Mechanical and Engineering course at Tulane some practical experimental engineering work, Prof. Gregory, of the Department of Experimental Engineering, arranged with Mr. T. D. Miller, Manager of the New Orleans Gas Company, to conduct a very exhaustive test having to do with the compressibility of gases. The work, which was done under the supervision of Prof. Gregory, assisted by Prof. Roberts, covered a period of 12 hours, and 13 Seniors participated in it."

Mr. Albert Strittmatter, Secretary of the National Gas and Gasoline Trades Association, informs us that, owing to the holding in Chicago of the automobile show the week of February 6 to 13, the Association convention will be held the 9th prox., instead of the 2d.

Mr. Fritz Beck notifies us that at the last shareholders' meeting of the "Pneumatic Gas Lighting Company," the officers elected were: Directors, B. A. Block, W. Haefeli and F. Beck; President, B. A. Block; Secretary, Treasurer and Manager, F. Beck.

WE are in receipt of a copy of "Bulletin G–I," recently issued at the instanco of the Public Service Commission, Second District, State of New York, which has to do with the rules and regulations governing the inspection of gas as guides to the employees of the Board. The book of rules and orders is very complete and in the main does much credit to its compilers.

THE proceedings against the county authorities by the Tacoma (Wash.) Gas and Light Company, opposing the 1907 assessment upon its franchises and personal property, were decided recently by Judge Clifford, of the Superior Court. His honor held that there had been a double assessment for 1907 upon its property, and that the assessor, in figuring the value of the property, had figured the bonded indebtedness at par value, whereas the evidence showed it was only worth 85 cents on the $1. The Court held that $21,000 should also have been exempted as credits. The net result of the decision was a cut from $516,181 to $403,767 in the assessment. The franchise assessment was fixed by the Court at $143,100 and the personal property assessment at $260,667. The suit was decided without cost to either party. The Company raised the contention in the suit that because of the fact that $11,000 on deposit in the banks of Pierce county had not been assessed under a State law, the assessment upon its property was illegal because it would have been less had this money been assessed. While the Supreme Court has held the law invalid as it provides for the exemption of monies in banks from taxation, the Court held that this did not have any bearing on the case, as the Company could not contend that its assessment was too high because other property was not properly assessed."

MR. A. V. WAINRIGHT has resigned the position of Manager to the Mohawk Gas Company, of Schenectady, N. Y., to accept the position of New Business Manager of the Susquehanna Light and Power Company, with headquarters in New York city. His successor is Mr. M. W. Offut, of Philadelphia.

THE Tenny-Royce syndicate has secured a decided controlling interest in the properties of the Fitchburg (Mass.) Gas and Electric Light Company.

MR. R. F. REED is informed that the annual meeting of the Peoples Gas Light and Coke Company Chicago, will be held the 10th prox.

MR. WILLIAM E. FLECKSER, has been named by Mayor Minard as inspector of lamps and gas, for Lockport, N. Y.

REPRESENTATIVE JOHN J. HAYES, of Charlestown, Mass., has filed a petition in the State House which declares:

"On and after January 1, 1909, it shall be unlawful for persons or corporations engaged in the distribution or sale of gas to charge more than 80 cents per 1,000 cubic feet." It is further provided "that if the law is infracted the inspector may be fined or imprisoned, or both." We thought we had it pretty severe in New York on such account; but imagine how much worse off the gas men would be with an 80-cent rate in Charlestown as against the similar one in New York. However, Mr. Hayes' measure may eventually be stifled by the rains of legislative disapproval, whereas in New York the figure is a fact accomplished.

THE earnings of the Denver (Col.) Gas and Electric Company show a gain of 19 per cent. over those recorded for the previous year. The Commercial Engineers out Denver way seem to be meeting with success.

FOR the first time since 1896 the earnings of the artificial gas division of the Columbus (O.) Gas Company show a profit over all charges.

MR. R. S. GARDINER is informed that the successor to Mr. Homer Honeywell in the Presidency of the Lincoln (Neb.) Gas Company is Mr. B. C. Adams. He was General Superintendent of the Company for 2 years or more.

MR. NORMAN WIMMER has been appointed Superintendent of the Perry (Ia.) Gas Campany. It is quite likely that the generating apparatus of the Company will be changed to that of the standard water gas type.

TO show that the Milwaukee Gas Light Company figures largely in the domestic economy of that city one only has to note that its check for taxes on city account for the year amounted to $156,421.98. Only three other taxpayers paid in a larger amount.

FROM the figures submitted to the Public Service Commission for the First District of New York by the Consolidated Gas Company, for the year ended December 31, 1907, as to the operating expenses of the Company, the output is shown to be, in thousands cubic feet:

| Output, Cubic Feet. | | | | | Value at $1. |
|---|---|---|---|---|---|
| 5,849,269 | through ordinary meters, at | $1.00 | per | 1,000.... | $5,849,267 |
| 801,031 | " prepay..... at | 0.99 | " | .. | 793,352 |
| 156,530 | on street lighting account, at | 0.90 | " | .. | 140,877 |
| 58,950 | on public building " at | 0.90 | " | .. | 53,950 |
| 11,837 | to other companies..... at | 1.00 | " | .. | 11,837 |
| 6,877,616 | | | | | $6,848,388 |
| | Deduct 20 cents per 1,000 on reserved account. | | | | 1,331,025 |
| | Net..... | | | | $5,517,863 |

The miscellaneous receipts were: Sales of residuals, $136,283; rental of gas stoves, $72,631; profit on sales of stoves and appliances of all sorts, $4,268; income on lamp maintenance account, $129,894. The total net was $5,860,430. The total operating expense amounted to $5,029,725.

THE Board of Trustees of the Rochester (N. Y.) Railway and Light Company have named the following executive management:

*President*—Mr. Horace E. Andrews.
*Vice-Presidents*—Messrs. W. K. Vanderbilt, G. A. Hollister, R. M. Searle.
*General Manager*—James T. Hutchins.

From the list it will readily be seen that Mr. R. M. Searle keeps moving up.

A SUIT for damages, in the sum of $10,000, has been brought by Charles S. Larned, against the Los Angeles (Cal.) Gas and Electric Company, for damages caused by an explosion of gas at a fire in the Espes Building, Los Angeles, the evening of September 8th, 1908. Complainant is a member of the Los Angeles city fire department, and the injuries were received by him while performing his duties as such city employee.

BROOKLYN, N. Y., has its Canon Chase, Manhattan, N. Y., has its Dr. Parkhurst, and Chicago had its "Billy" Sunday, all of whom on more than one occasion had a fling at the local gas suppliers. Other cities, too, have suffered from strokes of the churchly rod; but we venture the thought that in none of those named were the owners of the gas plants obliged to submit quietly to a tirade similar to the following, which was raucously emitted by Rev. Geo. R. Robins, of the Lincoln Park (Cincinnati) Institutional Baptist Church, as a prelude to his "regular sermon," the evening of Sunday, the 10th inst.. He said: "Since the world began was it ever known of any city charging a part of its inhabitants 30 cents for light and another part 75 cents? If not, then why in the name of Almighty God and justice should this stigma be suffered to rest upon the people of the Queen City of the West in America? Can we not see that we, the people of this city, are being held up to ridicule all over the land? Are we stupid? Is the press gagged? Is the pulpit afraid of stockholders in the pews? We can pray till the crack of doom for a revival of religion in Cincinnati and it will not come until the pulpit cries out against the sin of injustice, until the press shall plead and demand the rights of the poor and oppressed, until stockholders shall surrender their stock, or see we, the people, have our rights, and those responsible for selling gas at two prices shall repent in sackcloth and ashes. Are we who are paying 75 cents sure we are not having a poor mixture of the natural and artificial gas? Has the Union Gas and Electric Company given any possible assurance we are not? Will the President present the convincing evidence that the gas furnished for 75 cents is not mixed? We are tired of these intimations occasionally flung at us through certain papers, that we may have gas in March, or December, or any other indefinite time this year or next. Give us intelligent information. Citizens, awake!" Then we are told he went on with a sermon steeped with the thought that we should put our faith, first, in God; next in our fellow man! And this is religion.

AT the annual meeting of the Slatington (Pa.) Gas Company the officers elected were: President, Walter L. Jones; Vice-President, John Taylor; Treasurer, Joseph Richards; Secretary, H. E. Griffin.

MR. C. W. HUNTER has arranged for extensions to the main system of the Citizens Gas Company, Ocala, Fla., aggregating 5 miles.

## The Market for Gas Securities.

Inanimation prevails in the market for city gas shares, and little wonder! The high court has delivered the plexus blow to the gas industry of New York State from which it will not recover for many a day. However, never despair. If living investors are not to reap their fair reward, it is likely their children will. So, let's try to help the children. Quotations for Consolidated are to-day (Friday afternoon) 128–128½. It may seem timely to mention that there is quite a good sized short interest existing.

Brooklyn Union stands up to the rack amazingly well; but the tremendous growth in its business warrants purchasing even at current rates. Peoples, of Chicago, is now somewhere near its value, at 104½ bid. The general gas share market is active, at firm figures, and the bond market is in better condition than since May, 1906.

## Gas Stocks.

**Quotations by George W. Close, Broker and Dealer in Gas Stocks.**

16 WALL STREET, NEW YORK CITY.

JANUARY 25.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

| *N. Y. City Companies.* | *Capital.* | *Par.* | *Bid.* | *Asked.* |
|---|---|---|---|---|
| Consolidated Gas Co. | $78,177,000 | 100 | 128 | 128½ |
| Central Union Gas Co.— | | | | |
| 1st 5's, due 1972, J. & J. | 2,000,000 | 1,000 | 98 | 101 |
| Equitable Gas Light Co.— | | | | |
| Con. 5's, due 1932, M. & S. | 1,000,000 | 1,000 | — | 105 |
| Mutual Gas Co. | 3,500,000 | 100 | 190 | 160 |
| New Amsterdam Gas Co.— | | | | |
| 1st Con. 5's, due 1948, J. & J. | 11,000,000 | 1,000 | 99 | 101 |
| New York & Richmond Gas Co. (Staten Island) | 1,500,000 | 100 | 37 | 43 |
| 1st Mtg. Gold Bds. 5 p. ct. | 1,000,000 | — | 100 | 101 |
| New York and East River— | | | | |
| 1st 5's, due 1944, J. & J. | 3,500,000 | 1,000 | 100 | 105 |
| Con. 5's, due 1945, J. & J. | 1,500,000 | — | 97 | 101 |
| Northern Union— | | | | |
| 1st 5's, due 1927, J. & J. | 1,250,000 | 1,000 | 86 | 91 |
| Standard | 5,000,000 | 100 | 70 | 100 |
| Preferred | 5,000,000 | 100 | 100 | 125 |
| 1st Mtg. 5's, due 1930, M. & N. | 1,500,000 | 1,000 | 100 | 105 |
| The Brooklyn Union | 15,000,000 | 1,000 | 120 | 130 |
| 1st Con. 5's, due 1948, M. & N. | 15,000,000 | — | 91½ | 92 |
| Yonkers | 999,650 | 500 | 190 | — |
| *Out-of-Town Companies.* | | | | |
| Bay State | 50,000,000 | 50 | 1¼ | 1⅝ |
| " Income Bonds | 2,000,000 | 1,000 | — | 75 |
| Binghampton Gas Works | 450,000 | 100 | — | 65 |
| " 1st Mtg. 5's | 500,000 | 1,000 | 95 | 100 |
| Boston United Gas Co.— | | | | |
| 1st Series S. F. Trust | 7,000,000 | 1,000 | 82 | 85 |
| 2d " " " | 3,000,000 | 1,000 | 47½ | 50 |
| Buffalo City Gas Co. | 5,500,000 | 100 | 5 | 8 |
| Bonds, 5's | 5,250,000 | 1,000 | 63 | 66 |
| Capital, Sacramento | 500,000 | 50 | — | 35 |
| Bonds (6's) | 150,000 | 1,000 | — | — |
| Chicago Gas Co. Guaranteed Gold Bonds | 7,680,000 | 1,000 | 104 | 106¼ |
| Cincinnati Gas and Electric Co. | 29,500,000 | 100 | 90½ | 91 |
| Columbus (O.) Gas Co., 1st Mortgage Bonds | 1,500,000 | 1,000 | 96 | 98 |
| Columbus (O.) Gas Lt. & Heating Co. | 1,682,750 | 100 | 90¼ | 91 |
| Preferred | 3,026,500 | 100 | 75½ | 80 |
| Consumers, Toronto | 2,000,000 | 50 | 200 | 204 |
| Consolidated, Baltimore | 11,000,000 | 100 | — | 105 |
| Mortgages, 6's | 3,000,000 | — | — | 118 |
| Chesapeake, 1st 6's | 1,000,000 | — | — | — |
| Equitable, 1st 6's | 910,000 | — | — | — |
| Consolidated, 1st 5's | 1,490,000 | — | — | 112 |
| Consolidated Gas Co. of N. J. | 1,000,000 | 100 | 15 | 17 |
| Con. Mtg. 5's | 880,000 | 1,000 | 92 | 95 |
| Bonds | 75,000 | — | — | 100 |
| Denver Gas and Electric | — | — | 74½ | 75 |
| Detroit City Gas Co | 5,000,000 | 50 | — | 50 |
| " Prior Lien 5's | 4,619,000 | 1,000 | 97 | 100½ |
| Detroit Gas Co., 5's | 381,000 | 1,000 | 75 | 80 |
| Equitable Gas & Fuel Co., Chicago, Bonds | 2,000,000 | 1,000 | — | 101 |
| Essex and Hudson Gas Co. | 6,500,000 | — | 39 | 40 |
| Fort Wayne | 2,000,000 | — | — | — |
| " Bonds | 2,000,000 | — | 55 | — |
| Grand Rapids Gas Light Co., 1st Mtg. 5's | 1,225,000 | 1,000 | 104½ | 105 |
| Hartford | 750,000 | 25 | 190 | 200 |
| Hudson County Gas Co., of New Jersey | 10,500,000 | — | 112 | 113½ |
| " Bonds, 5's | 10,500,000 | — | 103 | 103½ |
| Indianapolis | 2,000,000 | — | 60 | 70 |
| " Bonds, 5's | 2,650,000 | — | 104½ | 105 |
| Jackson Gas Co. | 250,000 | 50 | 82 | — |
| " 1st Mtg. 5's | 290,000 | 1,000 | 97 | 100 |
| Kansas City Gas Light Co., of Missouri | 5,000,000 | 100 | — | 36 |
| Bonds, 1st 5's | 3,822,000 | 1,000 | 102 | 104 |
| Laclede Gas Co., St. Louis | 10,000,000 | 100 | — | 100 |
| Preferred | 2,500,000 | 100 | 60 | 90 |
| Bonds | 10,000,000 | 1,000 | 104 | 104¼ |
| Lafayette Gas Co., Ind. | 1,000,000 | 100 | — | 60 |
| Bonds | 1,000,000 | 1,000 | 60 | 65 |
| Louisville | 2,570,000 | 50 | 143 | 145 |
| Madison Gas and Electric Co. | | | | |
| " 1st Mtg. 6's | 350,000 | 1,000 | 106 | 108½ |
| " 6 per cent. scrip, due 1910 | 100,000 | 25 | 60 | 60½ |
| Massachusetts Gas Companies, of Boston | 25,000,000 | 100 | 61 | 61¼ |
| Preferred | 25,000,000 | 100 | 90 | — |
| Montreal Gas Co., Canada | 3,000,000 | 100 | 218 | 218¾ |
| Nashville Gas Light Co. | 1,000,000 | 100 | 110 | — |
| Newark, N. J., Con. Gas Co. | 6,000,000 | — | 56 | 58 |
| Bonds, 6's | 6,000,000 | — | 137 | 138 |
| New Haven Gas Co. | 2,000,000 | 25 | 200 | — |
| Peoples Gas Lt. & Coke Co., Chicago | 25,000,000 | 100 | 104¼ | 104½ |
| 1st Mortgage | 20,100,000 | 1,000 | — | — |
| 2d " | 2,500,000 | 1,000 | 104 | — |
| Rochester Gas & Electric Co. | 2,150,000 | 50 | 88 | — |
| Preferred | 2,150,000 | 50 | 118 | — |
| Consolidated 5's | 2,000,000 | — | 104½ | 105½ |
| San Francisco Gas Co., Cal. | 15,500,000 | — | — | — |
| St. Joseph Gas Co.— | | | | |
| 1st Mtg. 5's | 751,000 | 1,000 | 92 | — |
| St. Paul Gas Light Co. | 1,500,000 | 100 | 45 | 47 |
| 1st Mortgages, 6's | 650,000 | 1,000 | 113 | 116 |
| Extension, 6's | 600,000 | 1,000 | 112½ | 115 |
| General Mortgage, 5's | 2,465,000 | 1,000 | 96¼ | — |
| Syracuse Gas Co., N. Y. | 1,975,000 | 100 | 50 | 55 |
| Bonds | 2,047,000 | 1,000 | 102 | — |
| Washington (D. C.) Gas Co. | 2,600,000 | 20 | 342½ | 345 |
| 1st Mortgage, 6's | 600,000 | — | — | — |
| Western Gas Co., Milwaukee | 4,000,000 | — | — | — |
| Wilmington (Del.) Gas Co. | 600,000 | 50 | 220 | — |

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1754-3

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In January, 1907, the above company installed a Rotary Meter of 60,000 cubic feet capacity per hour.

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These meters are shown in the above illustration.

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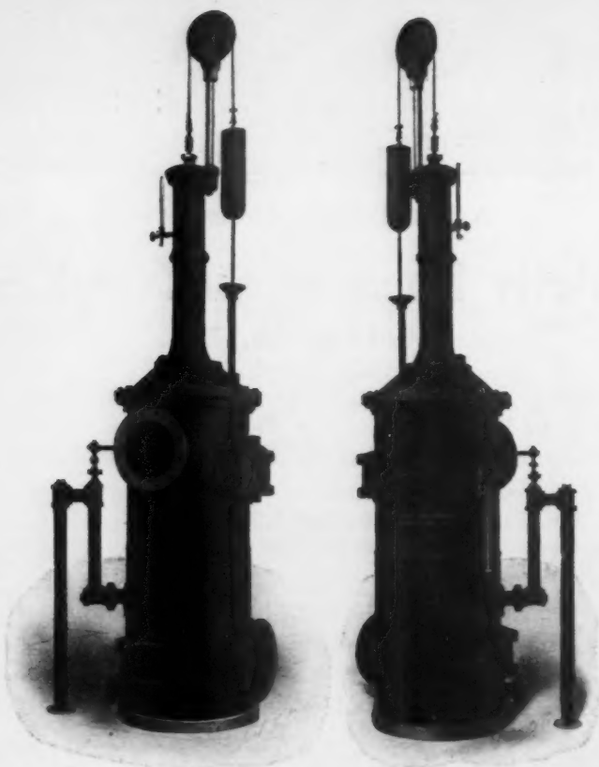

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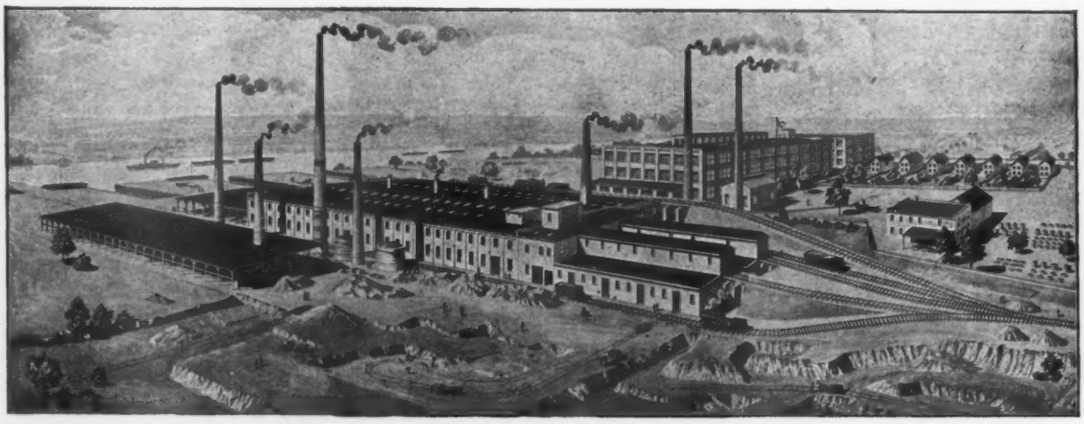

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Acid-Proof Stoneware of Every Description,
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**Our works have been thoroughly remodeled by the installation of the most modern machinery and up-to-date processes minimizing cost of manufacture. Laboratory on the premises, equipped with all the requisite apparatus, assuring absolute uniformity of material, also enabling us to determine composition of material for specific purposes. Manufacture under the supervision of chemical engineers of broad experience and many years' training in this line.**

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A line to us will bring one of our men to tell YOU how it can be done at YOUR Plant.

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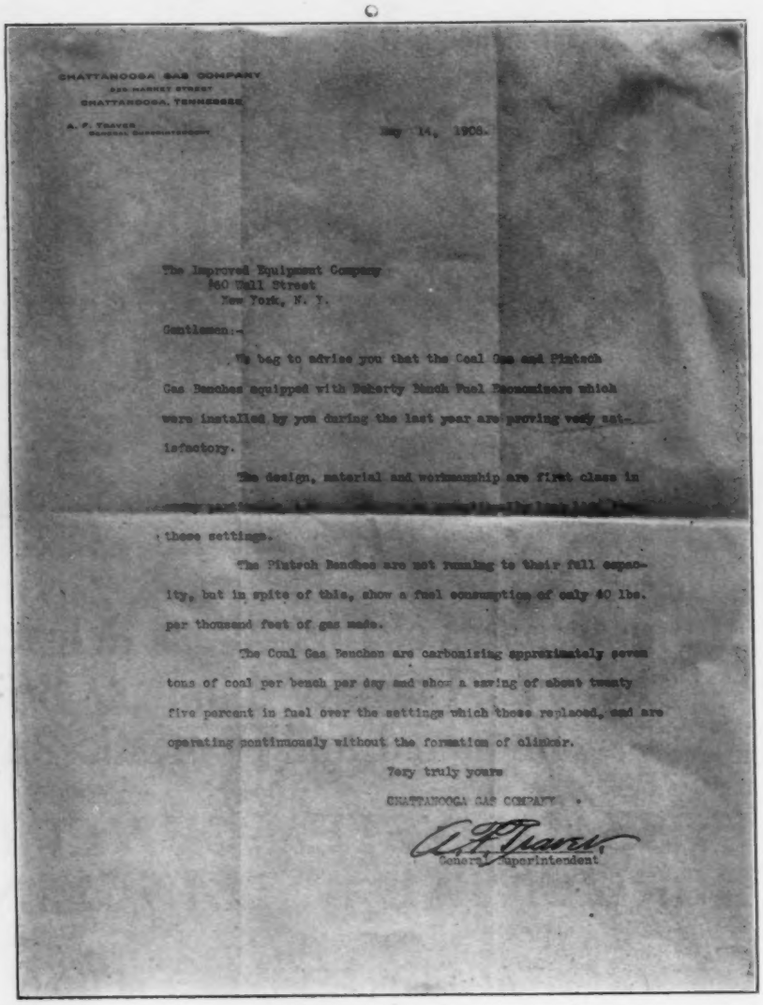

CHATTANOOGA GAS COMPANY
826 MARKET STREET
CHATTANOOGA, TENNESSEE

A. F. Traver
General Superintendent

May 14, 1908.

The Improved Equipment Company
60 Wall Street
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Gentlemen:-

We beg to advise you that the Coal Gas and Platech Gas Benches equipped with Doherty Bench Fuel Economizers which were installed by you during the last year are proving very satisfactory.

The design, material and workmanship are first class in these settings.

The Platech Benches are not running to their full capacity, but in spite of this, show a fuel consumption of only 40 lbs. per thousand feet of gas made.

The Coal Gas Benches are carbonizing approximately seven tons of coal per bench per day and show a saving of about twenty five percent in fuel over the settings which these replaced, and are operating continuously without the formation of clinker.

Very truly yours
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A. F. Traver
General Superintendent

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ALL CONTRACTS MADE AS OF ST. LOUIS.

Eleven Millions Capacity in One Retort House.

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## PLATE AND STRUCTURAL WORK OF EVERY DESCRIPTION.

## COMPLETE COAL GAS PLANTS.

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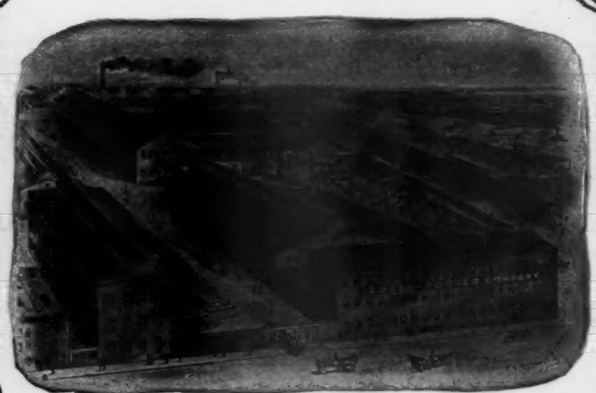

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P. & A. TAR EXTRACTORS FOR WATER GAS

ROTARY AMMONIA SCRUBBERS

SHAVING SCRUBBERS PURIFIERS STREET GOVERNORS

MAIN OFFICE AND WORKS
BRIDGE & OGDEN STREETS
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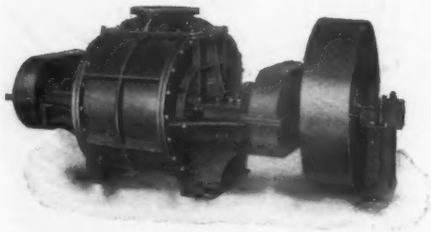
ESTABLISHED 1865



5 to 8 lb. Machine.

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## GAS EXHAUSTERS AND BLOWERS

**Are Superior.**

When in the Market, Write us.

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Double and Single Gate Valves, ¼" to 72",

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**Gas, Water, Steam, Oil, Ammonia, Etc.**

HOT GAS VALVES A SPECIALTY.

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BENCH WORK,
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SHAVING SCRUBBERS,
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FREDERICK W. FLOYD, Engineer.

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Last week we told you about our fireclay business. Now we take up with you the question of Bench Ironwork. We give you what you want, and not what we think you want. If you are undecided what you want it is our business to help you.

You may have the best arrangement of bench brickwork and yet get poor results. Gas in the retort is a good start, but is valueless till it makes the meter wheels go round. We can help you to make gas and preserve it well made for you to sell. It is cheaper to get gas just right than nearly right, and it is not right or approaching right if you leave some of it in the retorts, in the standpipes, and deposit part in the mains. It is the little details that tell in manufacturing gas. Choked pipes mean all kinds of loss and heaps of trouble. Carboned retorts will worry you all through the life of a bench, which may therefore not be a long time, but will seem a long time. Remember, "trifles make perfection, but perfection is no trifle." We know what you want, and if you ask us for it we can give it you. We want to enable you to do just a little better than you have been doing.

Write for Estimates on your Resetting Work. GAS WORKS DIVISION: A. S. B. LITTLE, Engineer.

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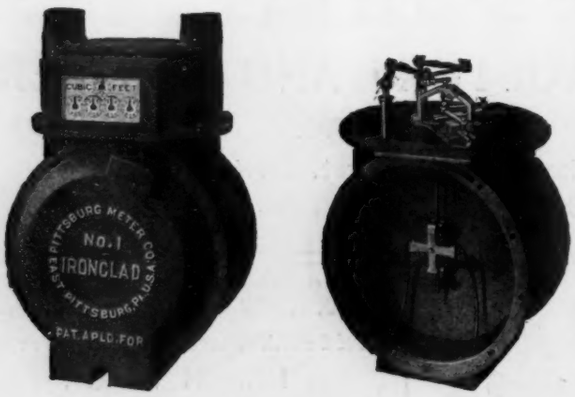
# COAL TAR AND AMMONIA,

By GEORGE LUNGE, PH.D. Third and Enlarged Edition.

Price, $15. For Sale by

A. M. CALLENDER & CO., 42 Pine Street, New York City.

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## Dry Gas Meters

### With Cast-Iron Cases.

Equally efficient for measuring either natural or artificial gas. Will meter to their maximum capacity with but slight absorption of pressure. Will measure accurately where low pressures or small lines exist. Will not rust and have no solder seams. Retain all the good qualities of the best tin meters, besides having valve seats cast in one piece and an improved method of communicating motion to the valves.

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## Pittsburg Meter Co.

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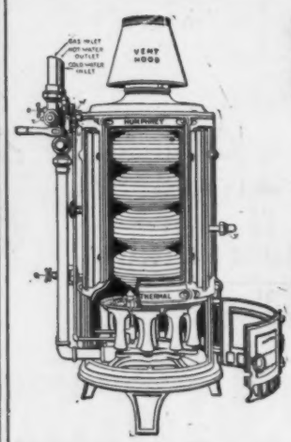
**Manufacturers of**

**Gas Meters and Water Meters.**

LLOYD CONSTRUCTION COMPANY

# GAS APPARATUS.

DETROIT – MICHIGAN




## Humphrey Auto-Thermal Instantaneous Water Heaters

Have every known desirable feature helping to efficiency, economy, durability and absolute safety.

**FULLY GUARANTEED.**
**PRICES LOW.**
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Will you help us sell them?

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**Kalamazoo, Mich., U. S. A.**

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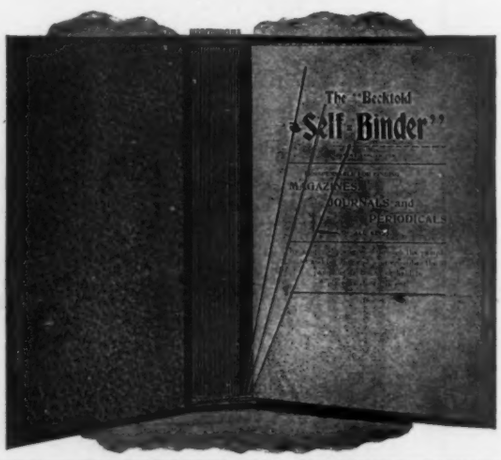
FOR THE

# JOURNAL.

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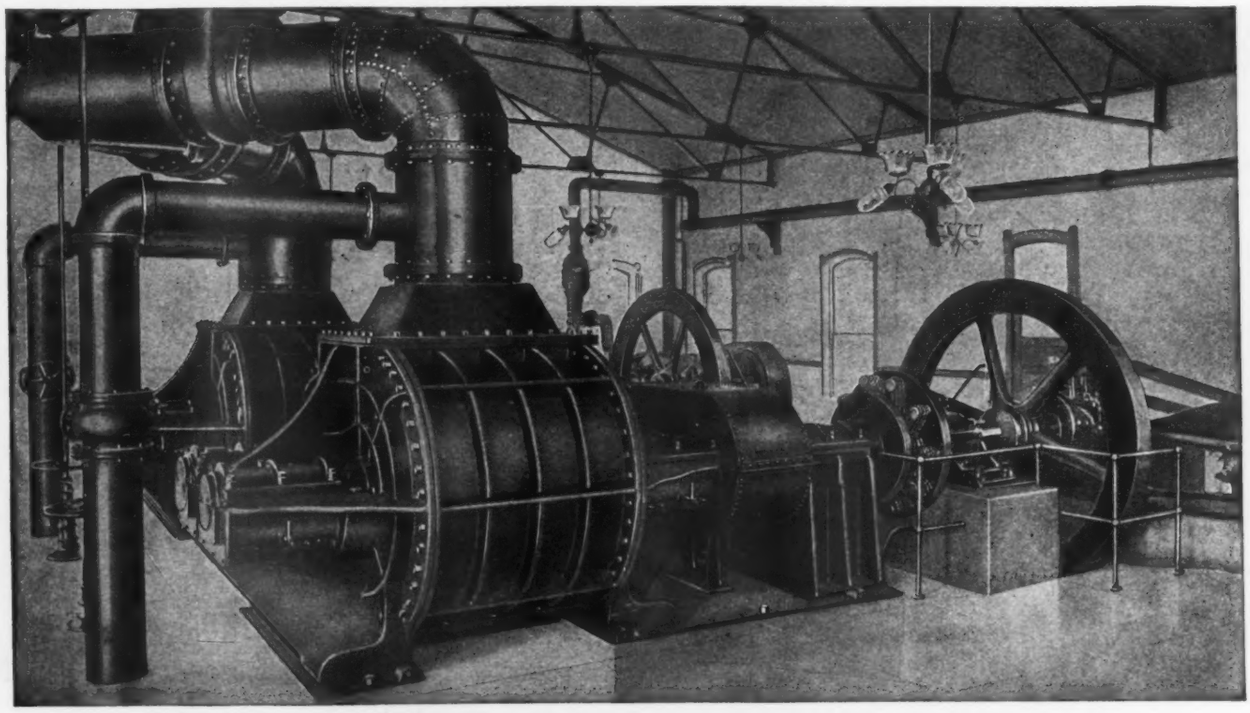

**P. H. & F. M. ROOTS COMPANY,**

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## Mueller Gas Plant Tools

**Embody the suggestions of practical gas plant men whose use of and experience in handling tools enables them to specify the character of tools that will prove most acceptable, serviceable and satisfactory.**

**Every tool bearing the name Mueller is carefully made and inspected, only the best material being used.**

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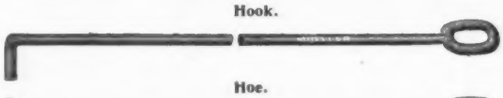
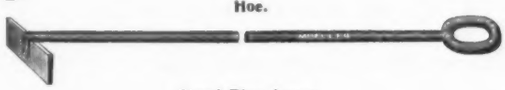
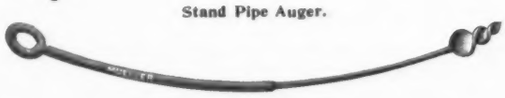


**Hoe.**



**Stand Pipe Auger.**



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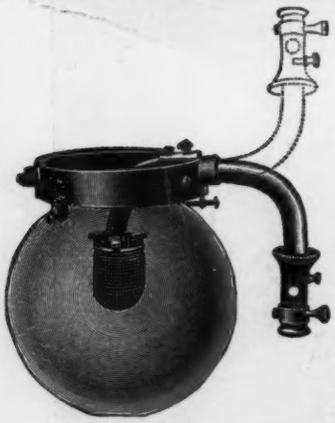
# BRAY INVERTED BURNERS

## WERE THE SENSATION OF THE CHICAGO SHOW.



With the gas pressure at 8-10ths and with other burners flashing and carbonizing,

**THE BRAY INVERTED**

filled the mantle perfectly and without a single flash back.

*If you were at Chicago you know this to be a fact.*

**BRAY QUALITY COUNTS.**

ORDER SAMPLES. YOU CAN SEND THEM BACK IF YOU WISH.

# W. M. CRANE COMPANY,

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FOR WATER AND GAS.

Also, FLANGE PIPE, LAMP POSTS, Etc.

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**THE BRISTOL COMPANY,**

Manufacturers of

TRADE MARK

**BRISTOL'S**

REG. U. S. PAT. OFFICE.

RECORDING PRESSURE GAUGES, RECORDING VACUUM GAUGES,
RECORDING THERMOMETERS, RECORDING VOLTMETERS,
RECORDING AMMETERS, RECORDING WATTMETERS,
AND
THE WM. H. BRISTOL ELECTRIC PYROMETERS AND PATENT SMOKED CHART RECORDERS.

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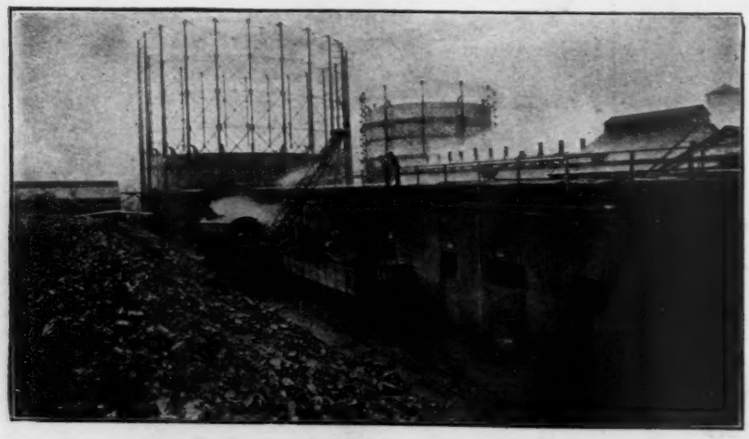

WRITE for our Catalogue "O" just issued. This Catalogue deals entirely with "Brownhoist" Machinery as used at Artificial Gas Plants for handling coal, coke and other materials rapidly and economically.

**THE BROWN HOISTING MACHINERY COMPANY,**

Designers and Builders of All Kinds of Hoisting Machinery.

Main Office and Works:
CLEVELAND, O.

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NEW YORK AND PITTSBURG.

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**PRACTICAL HANDBOOK ON GAS ENGINES,** WITH INSTRUCTIONS FOR CARE AND WORKING OF THE SAME,

By G. LIECKFELD, C.E. Translated with Permission of the Author, by GEORGE M. RICHMOND, M.E. Price, $1.

For Sale by A. M. CALLENDER & CO., 42 Pine St., New York City.

# AMERICAN METER CO.,

**NEW YORK, ST. LOUIS, PHILADELPHIA, SAN FRANCISCO, CHICAGO,**

## Photometrical and Experimental Apparatus.


### PUBLIC LIGHTING TABLE.

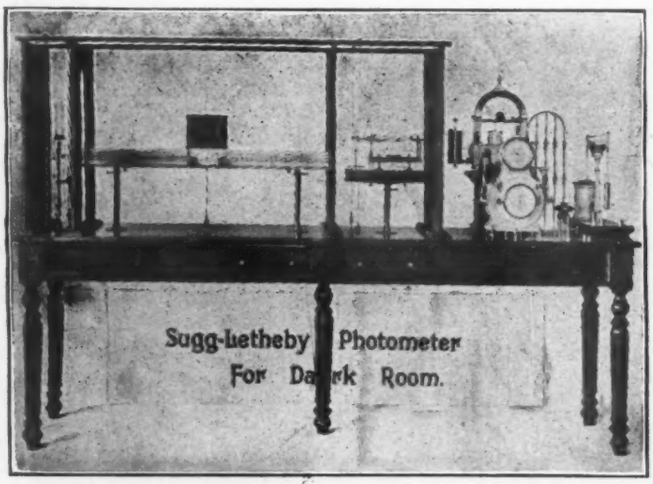
**FEBRUARY, 1909.**

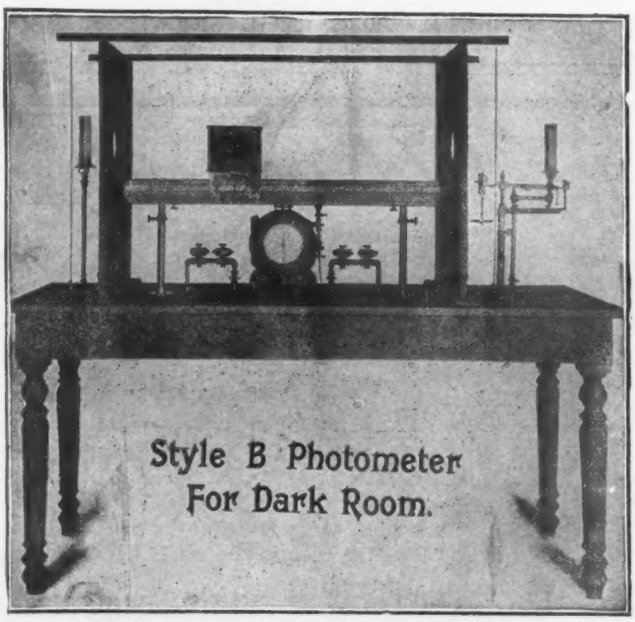
| Day of Week. | Date. | Table No. 1. Following the Moon. Light. | Extinguish. |
|---|---|---|---|
| Mon. | 1 | 4.30AM | 6.10AM |
| Tue. | 2 | 5.20 | 6.10 |
| Wed. | 3 | No L. | No L. |
| Thu. | 4 | No L.FM | No L. |
| Fri. | 5 | No L. | No L. |
| Sat. | 6 | 5.50PM | 7.40PM |
| Sun. | 7 | 6.00 | 8.40 |
| Mon. | 8 | 6.00 | 9.40 |
| Tue. | 9 | 6.00 | 10.40 |
| Wed. | 10 | 6.00 | 11.30 |
| Thu. | 11 | 6.00 | 12.30AM |
| Fri. | 12 | 6.00 | 1.40 |
| Sat. | 13 | 6.00LQ | 2.40 |
| Sun. | 14 | 6.10 | 3.40 |
| Mon. | 15 | 6.10 | 4.50 |
| Tue. | 16 | 6.10 | 5.50 |
| Wed. | 17 | 6.10 | 5.50 |
| Thu. | 18 | 6.10 | 5.50 |
| Fri. | 19 | 6.10NM | 5.50 |
| Sat. | 20 | 6.10 | 5.50 |
| Sun. | 21 | 6.10 | 5.40 |
| Mon. | 22 | 6.10 | 5.40 |
| Tue. | 23 | 6.10 | 5.40 |
| Wed. | 24 | 10.00 | 5.40 |
| Thu. | 25 | 11.10 | 5.40 |
| Fri. | 26 | 12.20AM | 5.40 |
| Sat. | 27 | 1.20 | 5.40 |
| Sun. | 28 | 2.20 | 5.30 |

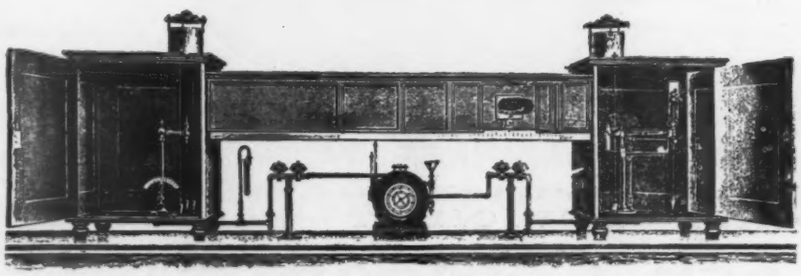
### TOTAL HOURS DURING 1909.

By Table No. 1.

| | Hrs.Min. |
|---|---|
| January | 212.20 |
| February | 183.40 |
| March | 173.00 |
| April | 151.10 |
| May | 144.10 |
| June | 138.50 |
| July | 145.40 |
| August | 160.30 |
| September | 180.00 |
| October | 201.00 |
| November | 216.30 |
| December | 233.40 |
| Total, yr. | 2140.30 |



Closed Photometer For Light Room.

**CIRCULARS SENT ON REQUEST.**

### PUBLIC LIGHTING TABLE.

**FEBRUARY, 1909.**

| Day of Week. | Date. | Table No. 2. NEW YORK CITY. All Night Lighting. Complete Lighting in One Hour From Time Given P. M. | Complete Extinguishing in 50 Minutes From Time Given A.M. |
|---|---|---|---|
| Mon. | 1 | 4.47 | 6.07 |
| Tue. | 2 | 4.47 | 6.07 |
| Wed. | 3 | 4.47 | 6.07 |
| Thu. | 4 | 4.47 | 6.07 |
| Fri. | 5 | 4.57 | 6.02 |
| Sat. | 6 | 4.57 | 6.02 |
| Sun. | 7 | 4.57 | 6.02 |
| Mon. | 8 | 4.57 | 6.02 |
| Tue. | 9 | 4.57 | 6.02 |
| Wed. | 10 | 4.57 | 6.02 |
| Thu. | 11 | 4.57 | 6.02 |
| Fri. | 12 | 5.07 | 5.57 |
| Sat. | 13 | 5.07 | 5.57 |
| Sun. | 14 | 5.07 | 5.57 |
| Mon. | 15 | 5.07 | 5.57 |
| Tue. | 16 | 5.07 | 5.52 |
| Wed. | 17 | 5.07 | 5.52 |
| Thu. | 18 | 5.07 | 5.52 |
| Fri. | 19 | 5.17 | 5.47 |
| Sat. | 20 | 5.17 | 5.47 |
| Sun. | 21 | 5.17 | 5.47 |
| Mon. | 22 | 5.17 | 5.47 |
| Tue. | 23 | 5.17 | 5.42 |
| Wed. | 24 | 5.17 | 5.42 |
| Thu. | 25 | 5.17 | 5.42 |
| Fri. | 26 | 5.22 | 5.32 |
| Sat. | 27 | 5.22 | 5.32 |
| Sun. | 28 | 5.22 | 5.32 |

### TOTAL HOURS DURING 1909.

| | Hrs.Min. |
|---|---|
| January | 428.30 |
| February | 358.15 |
| March | 353.10 |
| April | 298.10 |
| May | 263.20 |
| June | 234.45 |
| July | 248.30 |
| August | 278.00 |
| September | 311.25 |
| October | 370.05 |
| November | 397.40 |
| December | 438.35 |
| | 3980.25 |
| Deduct on account of 50 min. extinguishing time | 30.25 |
| Total, yr. | 3950.00 |

NEW YORK, 318 West 42d Street. BOSTON, 820 Beacon Building. PHILADELPHIA, Broad and Arch Streets. ST. LOUIS, 712 Roe Building. CHICAGO, 218 La Salle Street. SAN FRANCISCO, 512 Oak Street.

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....OF AMERICA....

No. 36.

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Uniformly SUCCESSFUL in 150 Cities and Towns.

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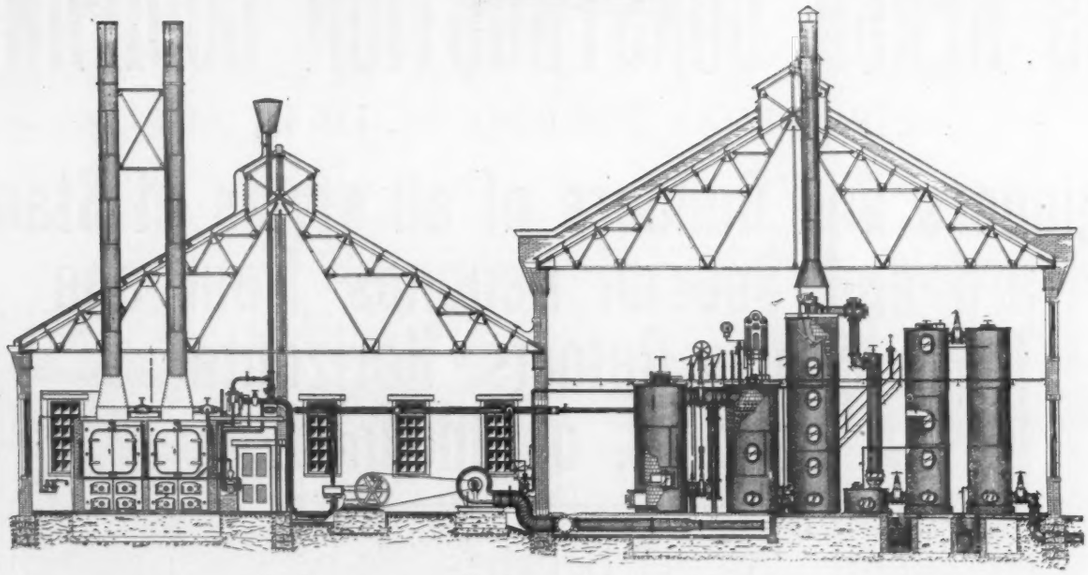

TOTAL SETS INSTALLED TO DECEMBER 31, 1908, . . . . . 690
TOTAL DAILY CAPACITY, TO DECEMBER 31, 1908, . . . . 558,565,000 cu. ft.

Tar Extractors for Carburetted Water Gas.
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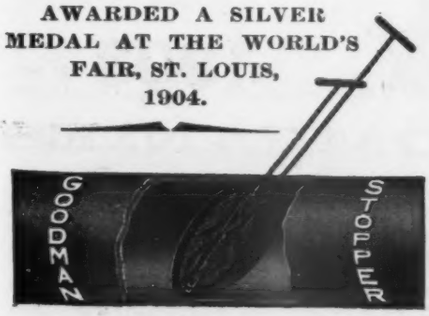


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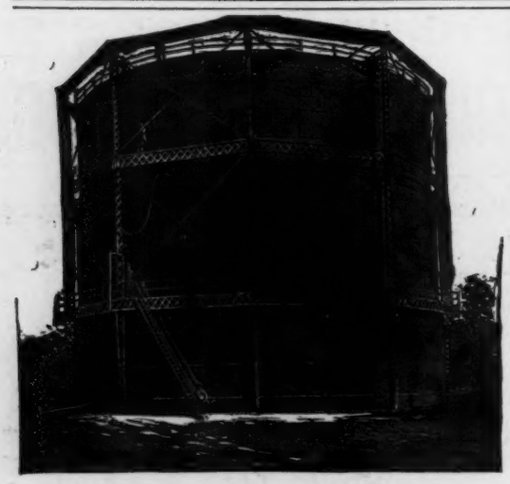

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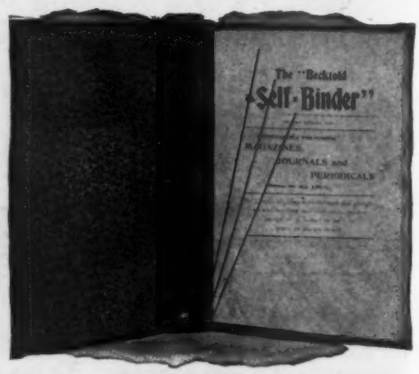


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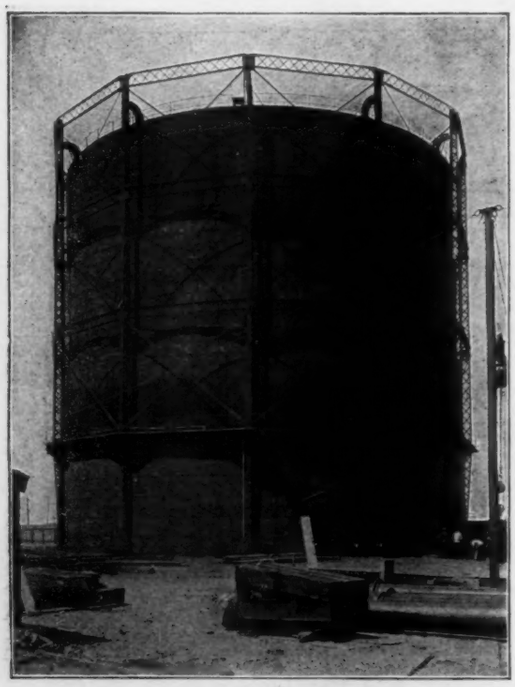

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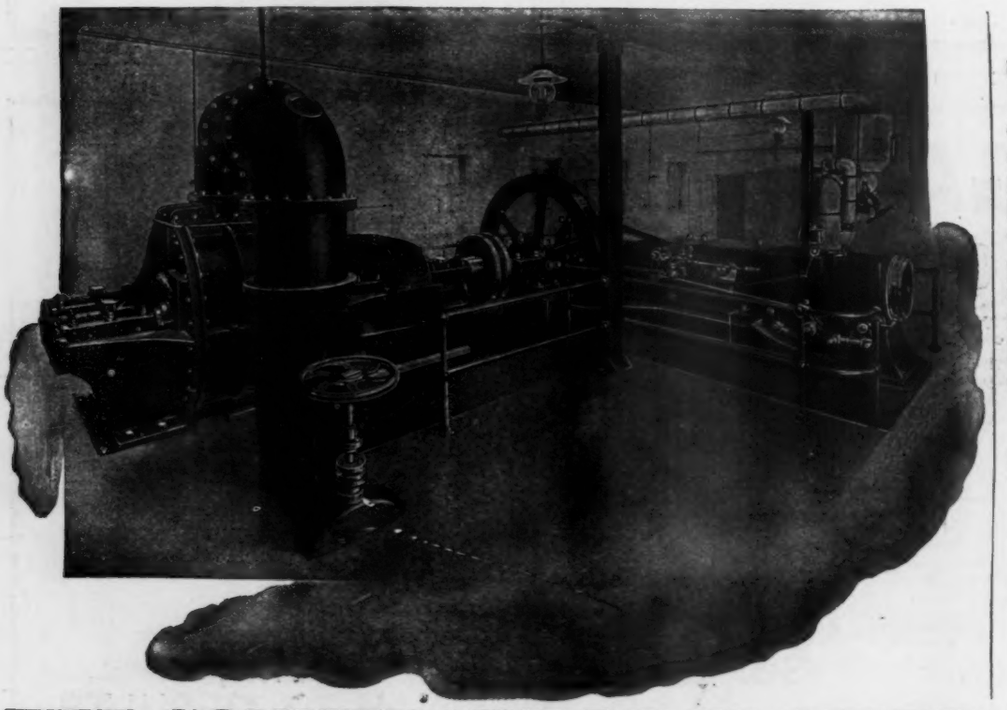

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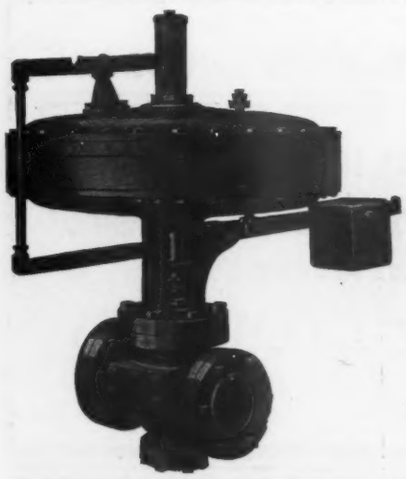

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Our Improved **Duplex Sensitive Governor** for district service will reduce high pressure gas to inches of water without variation. Absolutely safe and reliable. No complicated mechanism to get out of order. No auxiliary regulators or other devices to assist the main governor required. The most simple and perfect governor ever placed on the market. We also manufacture Holder Governors, Compressor Governors and Individual Service Governors for any inlet and outlet pressure.

More than 20 years' experience with the largest gas companies. Send for Catalog.

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Manufacturers of

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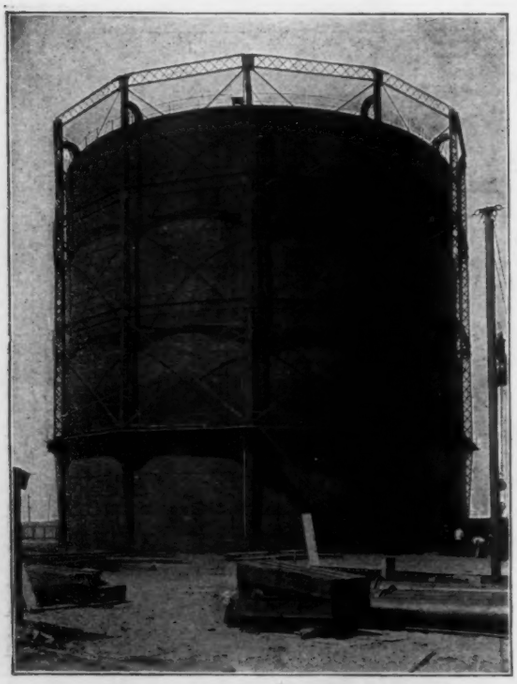

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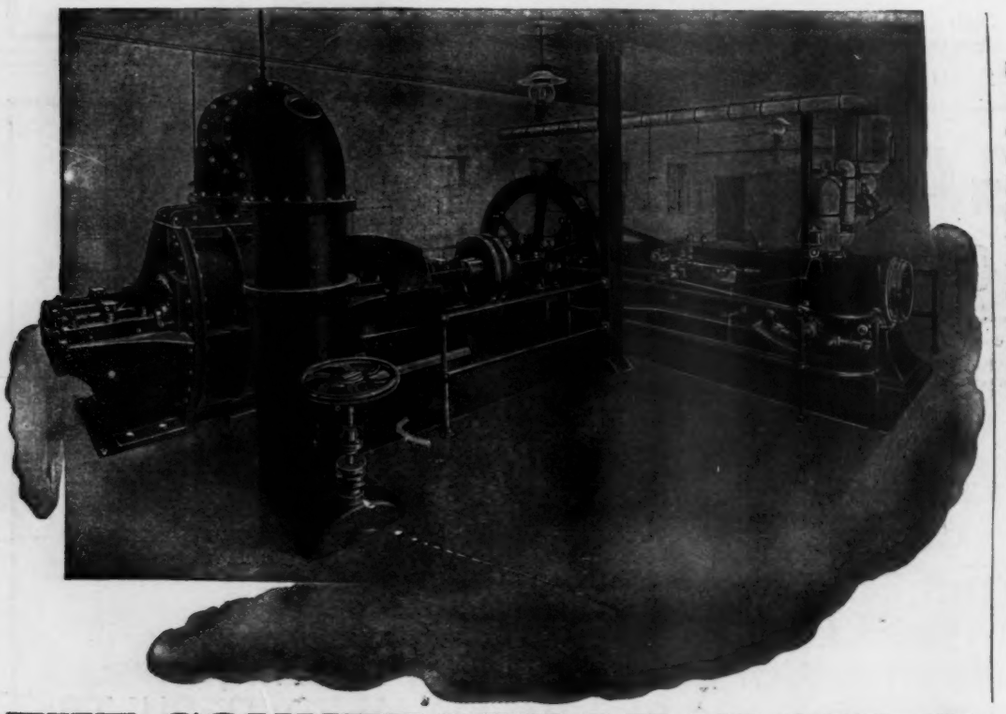

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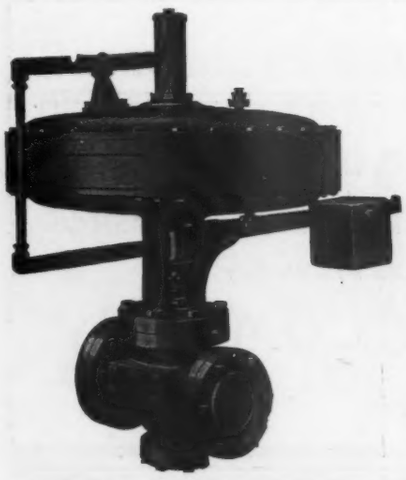

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